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GEOPHYSICAL ABSTRACTS 118

JULY - SEPTEMBER 1944

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 118
JULY - SEPTEMBER 1944[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 117 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, and 7292.

1. GRAVITATIONAL METHODS

7305. Ballarin, S. Tabelle per il calcolo delle derivate seconde del potenziale relativo a settori di anelli clindrici omogenei (Tables for Calculation of the Second Derivatives of the Potential Referred to Uniform Cylindrical Ring Sectors). Geofisica Pura e Applicata, Messina, vol. 5, 1943, p. 1.

Two tables are given for the calculation of second partial derivatives of the gravity potential of masses resolvable into uniform cylindrical ring sectors concentric about the position of the station. Underlying theory and possible applications are discussed. - V. S.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7303".

[2] Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior

7506. Closs, H. Beispiele von Kurven des Schweregradienten unter Berück sichtigung der Flankenverhältnisse in ausgewählten norddeutschen Salzstocktypen (Examples of Curves of the Gravity Gradient in the Light of the Character of the Flanks in Selected Types of North-Ger Salt Domes). Oel u. Kohle, Berlin, vol. 39, No. 6, 1943, pp. 141-14

The author presents 10 examples of North German salt domes selected with a view to showing the advantages of torsion-balance measurements. gravimeter and the seismic methods offer no substitutes for these advant The examples include the following salt-dome types: Simple slope, symme cal wedge stump (Keilstumpf), assymetric wedge stump, flank mass skewed ward, wedge stump with a heavy cap, etc., and various modifications ther These types are described and discussed; drawings illustrate their struc An additional example demonstrates the possibility of combining torsion-balance with other methods; it shows that certain data permit the identi cation of important parts of salt domes. The discussion of examples lea to the conclusion that the greatest caution must be exercised in the det nation of gradient maxima and of the direction of slope. Even though di tions may be distinctly indicated in some types of salt domes, in other this may not be the case. The necessity of a sufficient number of torsi balance stations is stressed. - V. S.

7507. Glangeaud. Louis. Gravimétrie, tectonique fine et structure profonde de la bordure externe du Jura (The Gravimetry, Fine Tectonics and Deep Structure of the Boundary of the Jura Mountains). Compt. rend., Paris, vol. 216, No. 20, 1943, pp. 671-673.

The distribution of Bouguer anomalies in the border zone of the Jur Mountains in France indicates the presence of several distinct deep-set structures. The broad characteristics of these structures are described The zones of maximal surface folding generally coincide with the regions where Bouguer anomalies have their highest gradients. - V. S.

7508. Lagerquist, P. A. Increased-Sensitivity Astatic Pendulum Gravime for Observing Variations of Gravity with Time. Ark. Mat. Astr. Fys Stockholm, 28A, vol. 1, No. 7, 1942, 20 pp.

An Ising astatic pendulum gravimeter is modified for laboratory use with the view to observing the diurnal variations of gravity. The ordin difference method with visual observations gives results with a mean err of 2.5 x 10^{-2}mgal. A difference method using an unstable pendulum with specially designed automatic registration apparatus gives a mean error o 1 x 10^{-2}mgal. The gravimeters show variations of the expected order ove a period of a few days. Further progress in increasing the sensitivity come by better temperature control and stricter selection of site, and b using pendulum fibers of small secular creep. - A. Hu, Sci. Abs., London vol. 47, No. 554, 1944.

7509. Legge, J. A., Jr. A Proposed Least-Square Method for the Determination of the Elevation Factor. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 175-179.

The purpose of this paper is to present a least-square method whereby the elevation factor is determined by fitting a polynomial to the gravity profile. The method is applicable to stations located along a straight line as well as those located at random over an area. - Author's abs.

7510. Lejay, Pierre. Nouvelles déterminations de la pesanteur dans le sud-est de la France (New Determinations of Gravity in the Southeast of France). Compt. rend., Paris, vol. 216, No. 2, 1943, pp. 105-106.

The results of measurements of gravity obtained at 87 stations in the southeast of France are given in a table. - V. S.

7511. Missouri Geological Survey. Gravimetric and Magnetic Maps of the State of Missouri. Rolla, Mo. Price, 50 cents for each map.

The State of Missouri has recently published gravimetric and magnetic maps of the entire State. The magnetic map is based on stations at intervals of 2 miles over the central and southern part of the State and at intervals of 1 mile over the northern part and the eastern and western edges of the State. The contour interval is 100 γ. These contours only (without station locations or values) are overprinted in red on the standard base map of the State at scale of 1:500,000. The magnetic map is a continuation of a magnetic map of the northwestern part of the state included in "The Geology of Northwestern Missouri," Missouri Geological Survey and Water Resources, vol. 25, 2d ser., 1938. The gravimetric map is based on gravimeter stations at intervals of approximately 5 miles along the main highways. Station locations and contours of Bouguer Anomaly at "Interval of 50 gravity units" are shown, also overprinted in red on the standard base map at scale 1:5,00,000. (The "unit" referred to here is 10^{-4}c.g.s. units, so the contour interval is 5 mg.) Gravity values at the individual stations are not indicated on the map and the basis of reduction (i.e., the density used) is not stated. The maps are available at a cost of $0.50 each from the Missouri Geological Survey, Rolla, Mo. - L. L. Nettleton, Geophysics, vol. 8, No. 4, 1943, p. 423.

7512. Noergaard, G. Un Gravimètre nouveau et des mesures à l'Ile de Bornholm (A New Gravimeter and Measurements on the Island of Bornholm). Tätigkeit balt. geodät. Kommission, 1938-1941, 1942, p. 31.

The author has developed a new gravimeter which operates without thermostats and other electrical devices increasing the weight of the apparatus. Gravity produces torsion of a quartz thread; the torsion moment is measured by means of an arrangement of mirrors. The average error does not generally exceed 0.2 mgl. The gravimeter is described. Tests of this instrument on

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the island of Bornholm have shown that it is easily transported and can work in unfavorable weather. Tables of measurements and isogam maps are given. - V. S.

7513. Pariisky, N. N. An Investigation of the Time Variations of Gravity in the Caucasus (Abs.) Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abs. of Papers, Moscow, 1937, p. 187.

The Seismological Institute of the Academy of Sciences of the U.S.S.F has investigated the variation of gravity with time in seismic regions. T Caucasus was selected for this work. Values of gravity obtained in 1903-1 were compared with values obtained at the same stations in 1935-36. 14 stations were used, and 10 stations will be added thereto in further work. The old determinations had been made with Sterneck's pendulums, and they were recalculated; Tbilisi (Tiflis) served as the station of reference. T mean quadratic error of the differences of gravity was estimated for an interval of 23-32 years by the Borrass method; the variations of length of the pendulum and all systematic errors were taken into account. The resul are presented in a table. The error ranges for different stations from 3. to 5.8 milligals. The differences of gravity values for 8 stations are le than, or equal to, this error; only for 2 stations do they reach 12 and 1 milligals. It is not yet possible to determine what part of the observed variations is caused by actual secular changes, but evidently these chang do not on the average exceed 2 or 3 milligals. - V. S.

7514. Razdymakha, G. S. A Centrifugal Gravimeter (in Russian). Tsentral Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografi GUGK pri SNK SSSR, Sbornik No. 7, Issledovaniia po Gravimetrii, Mosc 1941, pp. 3-28.

The pendulum gravimeter is precise, but its operations requires much care and time. The author offers a simpler gravimeter. It consists a small cylinder filled with a liquid and rotated about its axis. The su face of the equilibrated liquid will be a paraboloid of rotation, the par meters of which change with the force of gravity and the velocity of rota By measuring the relative changes of some parameter, such as the focus di tance, while knowing the angular velocity of rotation of the apparatus, i is possible to determine the relative value of the acceleration of gravit at a given place on the surface of the earth. The construction of such a centrifugal gravimeter has become possible due to the development by radi technique of generators with a high stability of axial rotation. The pre paper analyzes the theoretical problems of construction, namely, the sele of a parameter of the paraboloid of rotation for measurement, the calcula of the power of the mechanism rotating the cylinder, the hook-up and calc tion of the generator, the measurement of the temperature in the apparatu the determination of the initial volume of the liquid, and the testing an calibration of the instrument. The mathematical solutions involve differential and integral calculus. Drawings illustrate the apparatus. - V. S.

7515. Romberg, Frederick, and Barnes, V. E. Correlation of Gravity Observations with the Geology of the Smoothingiron Granite Mass, Llano County, Tex. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 79-93.

Gravitational observations were made, and the geology mapped, on the Smoothingiron granite mass in Llano County, Tex. The observed gravitational anomaly was interpreted to give depth and a subsurface shape for the mass. Maps are provided showing the gravity contours and the geology, and geological and mathematical appendixes are added. - Author's abs. (A discussion by W. H. Bucher accompanies the paper).

7516. Seismos Gesellschaft m. b. H. Bericht über die Ausfuhrung von Schweremessungen im Messgebiet Varna (Report on the Carrying out of Gravity Measurements in the Survey-District of Varna, Bulgaria). Jahrb. Bodenschätze Bulgarien, pt. A, vol. 1, 1941, p. 33.

The Seismos Co. reports on its gravimetric measurements in the region of Varna, Bulgaria. These measurements were completed in 1940. They covered an area of 560 km.^{2} and involved 197 stations. The findings are embodied in a map showing isogams and structures. The gravity picture of the region is characterized by the following principal elements: (1) The gravity high of Momino; (2) the gravity break of Venelin - Aksakovo; (3) the gravity threshold of Varna; (4) the high axis of Varna- South Svezdice; (5) the high axis of Priselci Gor - Pliznak; (6) the hypothetical high of Galata; (7) the gravity decline southward; and (8) the minimum zone of Dobri-Dol. These data are described. Westward from Momino's high lies the basin of Provadia with a salt dome, which was surveyed by torsion balance. The greatest geological importance from the standpoint of oil should be attached to the gravity break of Venelin - Aksakovo. - V. S.

7517. Shneiderov, A. J. The Exponential Law of Gravitation and Its Effects on Seismological and Tectonic Phenomena: A Preliminary Exposition. Nat. Research Council, Am. Geophys. Union, Trans. 1943, part I, Washington, D. C., 1943, pp. 61-88.

A new law of gravitation based on exponential interaction between matter and the LeSagian field is proposed and expounded, and two new fundamental phenomena - radional pressure of field on matter and radional compression of matter by field - are brought forward and explained. Two exponential formulas of gravitation are presented. The constitution of the earth as composed of definite layers, the ionization of which increases with their depth, and a gaseous electronic-atomic core of great elasticity and density are suggested, thus explaining nontransmittance of transverse vibrations by the core. Continuous expansion of the earth as a whole that goes on between contractions is inferred to be the cause of (a) parallelism in oppositely situated coasts, (b) "swelling" of ocean beds, (c) earthquakes, and (d) continuous morphological and tectonological changes in the earth's crust. Glacial periods are explained as a consequence of cataclysmic eruptions followed by reorientation of the poles and envelopment of the earth by a

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dense "curtain" of dispersed volcanic substance. Sudden changes in the earth's surface noted by Suess as accompanying a formation of new continents, oceans, and mountain chains are explained to be the consequence of major contractions which interrupt the continual expansion of the earth and shrinking of the earth's crust after a cataclysmic eruption. The continual increase in the length of the day due to the earth's net expansion is found to be too small to be observed, unless in a considerable perspective of time, while the cyclical variation in the length of the day, due to planetary influence on the shape of the earth, is considered to be within the scope of observation. - Author's abs.

7518. Zamorev, A. A. Determination of the Form of a Body by the Derivatives of the External Gravitational Potential (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geog. Geophys., Moscow, No. 1/2, 1942, pp. 48-54.

The writer has offered in a preceding paper a solution for the reverse problem of the theory of the potential for a two-dimentional case (see Geophys. Abs. 116, No. 7266). In the present paper, the preceding results are generalized in the light of new considerations. A basis is thereby gained for application of the theory of the potential to gravitational anomalies. It thus becomes possible to develop new methods for explaining these anomalies. In forthcoming articles the writer proposes to give practical examples. - V. S.

2. MAGNETIC METHODS

7519. Baird, H. F. Magnetic Decliration in New Zealand for Epoch 1943.5. New Zealand Jour. Sci. and Technol., B. General Section, Wellington, N. Z., vol. 25, No. 4, 1944, pp. 175-178.

Preliminary maps of magnetic declination in New Zealand derived from the present resurvey are delineated for epoch 1943.5, based on computations made from 109 points recently occupied. It has been discovered that throug out the length of the Dominion marked differences exist in the rate of secu lar variation. Consequently, fairly frequent reoccupation of suitable stations is necessary. While the general trend of Farr's 1903-5 isogonals has been confirmed, serious errors arise if they are amended merely by extr polating the amount of secular variation applicable to, and previously only known at, Christchurch. - Author's abs.

7520. Bitter, Francis. The Scientific Significance of Ferromagnetism. Jour. Washington Acad. Sci., Menash, Wis., vol. 33, No. 8, 1943, pp. 235-238.

The author deals with the scientific aspects of ferromagnetism. He re views briefly the theoretical contributions of Ewing, Weiss, Curie, Heisenberg, Bloch, and Slater and the recent experimental work at the Massachuset

Institute of Technology. It is now known that ferromagnetism is due to electrons that are neither so tightly bound to atomic cores as electrons in the lower energy levels nor so loosely bound as the conduction electrons. Recent experiments tend to emphasize that much more complicated phenomena exist that had been suspected. Accordingly, the next move is up to experimentalists. - V. S.

7521. Broughton, W. A. The Buckhorn Iron Deposits of Okanogan County, Wash.; Results of a Magnetic Survey. State of Washington, Div. of Geol., Rept. of Investigations 8, Olympia, Wash., 1943, 21 pp.

The building of dams at Bonneville and Grand Coulee has stimulated reexamination of iron deposits in Washington. One of the studies, made in June-August 1942, dealt with the Buckhorn deposits. It consisted of a magnetic survey with the Gurley dial compass and dip needle and covered the north and east slopes of Buckhorn Mountain (Copper Mountain). The areas of magnetic attraction are listed and shown on a geological map. There are eight areas of extremely high dip-needle readings; they may indicate faulted segments of the ore body, individual bodies of magnetite due to irregular replacement of the limestone, or merely sizable bodies of magnetite close to the surface; the accessory data essential for conclusive information are incomplete. The report describes regional and local geology and iron-ore deposits and includes estimates of iron reserves. - V. S.

7522. Eblé, Louis. Differentes sortes d'agitation magnetique (Different Kinds of Magnetic Disturbance). Compt. rend., Paris, vol. 216, No. 9, 1943, pp. 305-306.

Photographically recorded curves of the constituents of the terrestrial magnetic field or of declination usually show no regularity. It is possible to observe on them pulsations, loops, hooks, "magnetic storms", etc. Moreover, these disturbances show diurnal variations in intensity. The diurnal variation of average magnetic characters reaches a maximum during the night, a principal minimum in the morning, and a secondary minimum near 16 h. (4 p.m.). On the other hand, the diurnal variation of the hourly frequency of magnetic characters has the greatest frequency of weak disturbances near noon and the greatest frequency of strong disturbances early at night. This difference indicates that magnetic disturbance is really the product of at least two different components: (1) A short and rather regular disturbance developing mainly in the morning; and (2) a prolonged and irregular disturbance attaining its maximum at night. They are traceable to solar activity but have different immediate causes. The short disturbance is due to an immediate effect of the sun's ultraviolet radiations, while the long disturbance is due to a combined action of the ionosphere and of extraterrestrial currents. The observed diurnal magnetic variation results from their superposition. - V. S.

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7523. Ehrenhaft, Felix. Magnetolysis and the Electric Field Around the Magnetic Current (Abs.). Phys. Rev., Lancaster, Pa., vol. 63, Nos. 11-12, 1943, pp. 461-462.

The author summarizes his experiments. Between the vertical cylindric poles (magnetodes) of an electromagnet of soft Swedish iron, whose bases fo a horizontal gap, acidulated water is decomposed into oxygen and hydrogen gas. As long as the two poles immersed in the solution are not magnetized, we get pure hydrogen. But when the two poles are magnetized, we get a mixture of hydrogen and oxygen. The amount of gases evolved magnetically is proportional to the magnetic field. Microscopic observation shows that magnetically evolved gas bubbles carry either a North or South magnetic charge. In the experiments, magnetolysis and electrolysis were superposed. After a swarm of positive electrically charged hydrogen bubbles are produced, the magnetodes are short-circuited electrically. Each of these posi tively charged gas bubbles moves in a circle around the gap between the magnetodes, through which a constant magnetic current flows, reversing its direction on reversion of the magnetic field. It does so exactly as a sing magnetic pole would circulate around the constant electric current, reversi its direction with reversal of the electric field. The magnetic current is surrounded by circular electric lines of force. - V. S.

7524. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values. IV-V. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, 1944, No. 1, pp. 47-52; No. 2, pp. 109-118.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is continued in these issues (for parts I-III see Geophys. Abs. 114, 115, 117 - V. S.

7525. Herroun, E. F. A Comparison of the Magnetic Properties of Solid an Powdered Magnetites; with Observations on Coercive Force. Proc. Phys. Soc., London, vol. 55, pt. 4, No. 310, 1943, pp. 338-343.

Experiments were made with magnetites to determine the effects of powd ing on their magnetic properties and coercive force. A number of magnetit of high, medium, and low coercivity were collected in different countries. For each magnetite, some samples were cut in the form of bars from the soli mineral. Other samples were reduced to coarse- and fine-grained powders. part of the powdered samples was then formed into bars by mixing in a small quantity of a hot solution of photographic gelatin and compressing the substance; tests showed that such a procedure did not alter the properties of powders. Finally, the magnetic properties of solid magnetites and of powde magnetites were measured and compared; they are tabulated. The results can be summarized as follows: (1) Permeability is much reduced by powdering; (maximum permeability is reached at higher forces with powders than with solids; and (3) coercivity is increased in magnetites of low initial coercivity, but decreased with those of high coercivity. Observations are als presented on the persistence of magnetic structure. - V. S.

7526. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for October to December, 1943, and Summary for Year 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 1, 1944, pp. 53-61.

Tables and graphs are given with explanatory text. - V. S.

7527. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Tucson, Ariz., for 1933-34; at Cheltenham, Md., for 1933-34; at Sitka, Alaska, for 1935-36; and at Honolulu, Hawaii, for 1935-36. U. S. Coast and Geodetic Survey, Washington, D. C.; MO-15, 1943, 116 pp.; MO-17, 1943, 118 pp.; MO-18, 1944, 122 pp.; MO-119, 1944, 114 pp.

These publications contain extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, collected mean diurnal variations for each month, season, and year, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of D, H, and Z variometers with their abrupt changes, etc. The text includes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Author's abs.

7528. Lasareff, P. P. Contemporary Problems of the Earth's Magnetism (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Série Géog. et Géophys., Moscow, No. 1, 1943, pp. 29-40.

Problems of dividing terrestrial magnetic fields into normal and abnormal are discussed. Investigations of rocks from which values of a geomagnetic field at a given point may be obtained, and experiments with models by the use of which the connection between the normal and abnormal fields may be studied without mathematical calculations, are described. A method for determining the magnetic field of the earth at a fixed epoch is examined. Physical theories of geomagnetism are briefly outlined. - Author's abs., translated by W. A.

7529. Maurain, Charles. Sur les perturbations magnétiques à début brusque dans la région parisienne. Repartition annuelle et diurne des débuts brusques (The Magnetic Disturbances with Sudden Onsets Observed in the Region of Paris. Annual and Daily Distributions of Sudden Onsets. Compt. rend., Paris, vol. 217, No. 1, 1943, pp. 8-10.

Magnetic disturbances with sudden onsets (SC) were studied on the basis of the observations of the central French magnetic station near Paris. 350 typical cases were selected from the material for the last 60 years. The annual distribution of SC by months showed that they are more frequent in summer than in winter; the maximum frequency occurs in March and April;

minimal frequency, in November and December. The daily distribution of SC by hours showed that they are most frequent at 2-3 p.m. and least frequent at 8-9 a.m. The annual variation of the amplitudes of SC is found to correspond to the annual variation of the frequencies of SC; similarly, the dail variation of the amplitudes of SC corresponds to the daily variation of the frequencies of SC. The variation of amplitudes was studied for the horizontal component H where the amplitudes are larger than for the components Z and D. - V. S.

Missouri Geological Survey. Gravimetric and Magnetic Maps of the State of Missouri. Rolla, Missouri. Price, 50 cents for each map. (See Geophys. Abs. 7511.)

7530. Rougerie, Paul. Sur la distribution et la variation séculaire de l'aimantation terrestre (On the Distribution and the Secular Variatio of Terrestrial Magnetization). Compt. rend., Paris, vol. 216, No. 12, 1943, pp. 416-418.

This study is based on the data collected during the International Pol Year 1932-33. The author computed G (the local magnetic constant of L. A. Bauer) for 65 magnetic stations and obtained an average value G_m = 0.30821 gauss closely approximating Bauer's theoretical value G = 0.31089. The magnetic constant G increases from the poles to the equator; in the northe hemisphere this increase is about 200 γ per degree of latitude. The autho then determined the trend of the secular variation of G according to the data of some 30 observatories (the distribution of the earth's magnetizati had been shown by Nippoldt, Bauer, etc., to be essentially constant during 1910-33). The results indicated that the change in the trend of the variation reported by Maurain and Madinhac exists only at stations in Europe an continental Asia. At other stations G showed either a continuous increase (India, China, Japan) or else a continuous decrease (America, Australia). These findings show that the magnetization of the earth is a complex phenomenon and that the field of secular variation is assymetrical. - V. S

7531. Schwartz, G. M. Tracing the Duluth Gabbro Contact with a Magnetometer. Econ. Geol., Lancaster, Pa., vol. 39, No. 3, 1944, pp. 224-23

The contact at the base of the Duluth gabbro was traced for 50 miles where it is thickly covered with glacial drift. The rapidity with which this was done with a Schmidt-type vertical magnetometer suggests that such methods are useful in reconnaissance as well as in detailed work. General methods and results are summarized. - Author's abs.

7532. South African Mining and Engineering Journal. Magnetic Methods in Mining Practice: Uses in Prospecting and Separation. Johannesburg, South Africa, vol. 54, pt. 2, No. 2661, 1944, pp. 517, 529.

Felix Ehrenhaft considers that he can produce magnetic ions and prove the existence of magnetic currents. These discoveries, if substantiated, would revolutionize science. The author describes various practical utilizations of magnetic properties with a view to showing the potentialities of Ehrenhaft's discoveries. He deals briefly with mining practice, prospecting, civil engineering, magnetic separation, and industrial processes; examples are cited. Magnetic prospecting depends on the magnetic properties of subsurface bodies. Iron ores and igneous and metamorphic rocks are strongly magnetic, while most sedimentary rocks are weakly magnetic. Oil is found indirectly, mostly by searching for igneous rocks potentially related to oil formations. The various instances of discoveries by magnetic prospecting are mentioned, the factors in rock magnetization are discussed, and different types of prospecting instruments are indicated. - V. S.

7533. Strona, A. A. Results and Problems of Magnetometric Study of the Pre-Cambrian in the European Part of the U.S.S.R. (in Russian). Internat. Geol. Cong., Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 451-455.

The magnetic method is particularly well-suited for investigating the pre-Cambrian in European U.S.S.R. This method has already yielded many discoveries: (1) The Kremenchug, Nikopol, and Azov iron deposits were discovered, and the Krivoi Rog and Zheltaia Reka iron ore districts were expanded; (2) the Kola Bay, as well as the Ymandra and Onega regions within the Baltic shield, were found to contain iron ores; (3) the Kursk magnetic anomaly area was discovered to hold important iron deposits in the buried pre-Cambrian; and (4) numerous anticlinal structures covered by sediments and containing petroleum, gas, and helium were surveyed by the magnetic method. Some other examples are cited. These successes justify the conclusion, the author believes, that magnetometry should be assigned a leading role in the study of the pre-Cambrian in European U.S.S.R. - V. S.

7534. Terrestrial Magnetism and Atmospheric Electricity. Notes: Magnetic Survey of American Republics. Baltimore, Md., vol. 49, No. 1, 1944, p. 69.

Two magnetic field parties of the United States Coast and Geodetic Survey are in the American republics carrying on a program of repeat-station observations in cooperation with the governments of the countries concerned. This program is an extension of the program of 1941-43. One party is in Central America, the other in South America.

7535. Vestine, E. H. The Geographic Incidence of Aurora and Magnetic Disturbance, Northern Hemisphere. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 2, 1944, pp. 77-102.

This paper is concerned mainly with the variation with geographic position of the average daily frequency of aurora in high latitudes, and of geomagnetic disturbance. As regards geomagnetic disturbance, curves of equal disturbance are given. They were obtained as the average maximum

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range in total force of the disturbed days of the polar year, 1932-33. The directions of the disturbance vectors at the time of morning minimum at ea station were first used to adjust stations in geomagnetic latitudes 62° to 71° north to a circular auroral zone in latitude 67° north, thus obtaining the latitude distribution of the disturbance daily variation relative to this circular auroral zone. Next, the isomagnetic lines within this latitude belt were drawn symmetrically about the auroral zone curve previously obtained from the magnetic data, and suitable proportionate adjustments were made along the geomagnetic meridians. It was found that the latitude distribution of the range in disturbance daily variation is likely to affo a fair indication of the dependence on geographical position of the larger transient magnetic changes lasting from some minutes to several hours, suc as appear in bays, especially in high latitudes. A bibliography is appended. - V. S.

3. SEISMIC METHODS

7536. Agocs, W. B. A Method of Determining the Time Break on Deep Sea Seismic Records from the Water Sound Arrivals. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 163-174.

An abstract of this paper appeared in Geophysics, vol. 8, No. 3, 1943 p. 330 (see Geophys. Abs. 115, No. 7154).

7537. Byerly, Perry. Love Waves and the Nature of the Motion at the Orig of the Chilean Earthquake of November 11, 1922. Am. Jour. Sci., New Haven, vol. 19, No. 112, 1930, pp. 274-282.

On the assumption that the first motions of P and L types indicated b the seismograms of the Chilean earthquake preserve directional characteristics of the first motion at the focus (these directions are shown to be independent of epicentral distance between 39° and 162°) and that the firs preliminary waves recorded at the stations had their source in the reflex of primal shear waves at the earth's surface near the focus, the direction of first motions of the P and L types are interpreted to indicate as a sufficient source a shearing couple caused by a slip along a fault the strike of which lay anywhere from N. 27° E. easterly to E. 10° S. and whic dipped to the left (as one looks NE. or SE. from the epicenter along the strike) at an angle of dip of from 69° to 90°. The faulting was normal an the horizontal movement was to the left (looking transverse to the fault from the trace). - Author's abs.

7538. Finch, R. H. Harmonic Tremor. Volcano Letter, University of Hawai Honolulu, No. 483, 1944, pp. 1-2.

One manifestation of volcanic activity is a continuous vibration of the ground. As long as volcanic activity goes on, nearby seismographs record small tremors. When this activity ceases, the tremors disappear from seismograms. Observations of such tremors were made in Hawaii and Japan beginning about 1912. They were later distinguished into harmonic tremor with a uniform period and amplitude, and spasmodic tremor with a greater range of variation. The character of harmonic tremor is illustrated by Bosh-Omori seismograms from the Hawaiian Volcano Observatory. Four typical samples are presented to show this tremor under different conditions of the lava column at Halemaumau. The especially large tremors were recorded during some of the most violent fountaining ever observed at Kilauea. During Mauna Loa eruptions a mixed continuous tremor is recorded at the Hawaiian Observatory even though the source may be 22 miles away. In general, the tremor is larger when the magma column is falling than when rising. The harmonic tremor affords good evidence of underground surging of lava, whether or not magma is visible in the pit. - V. S.

7539. Gutenberg, Beno, and Richter, C. F. Apparent Origin Time of $\overline{S}$. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 4, 1943, pp. 269-279.

Representative travel times for 50 shocks in southern California indicate that transverse waves appear to leave the focus about half a second earlier, on the average, than longitudinal waves. If fault rupture is propagated with a speed greater then that of transverse waves, the originating of such waves along a moderately extended fault segment will completely explain the observations. An exact theory is given on the simplest assumptions. - Author's abs.

7540. Hayes, R. C. On Earthquake Distribution in New Zealand. Dominion Observatory, Bull. S-65, Wellington, 1944, pp. 236B-238B.

The distribution of destructive and nondestructive earthquake epicenters in New Zealand is presented on a map. The results, which include instrumental data on earthquake intensities, confirm results previously arrived at regarding the distribution of destructive shocks, and also provide additional detail regarding the variation of seismic activity from place to place. - Author's abs.

7541. Horton, C. W. A Note on the Reading of Seismograms. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 160-162.

It is shown that a quick appraisal of the error in reading seismograms can be made by a statistical count of the occurrence of the third decimal. A method of interpretation is shown by analyses of five samples. - Author's abs.

7542. Kats, A. Z., and Puchkov, S. V. Ground Vibrations Produced by Impact Disturbances (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 78-84.

A method is developed for determining the relationship between amplitudes of vibration of particles of the ground and the distances of these particles from the point of impact of a falling weight. Furthermore, the constant of elasticity of the ground is calculated. The problem of ground particles is approached in the light of the theory of central impact for two bodies of a different mass. The distribution of elastic displacements and stresses is studied in reference to distance from the point of impact; the discussion is mathematical. Certain experimental data on the vibratic of the ground under the impact of falling weights are further cited from t works of A. K. Biriul. They show that the distribution of amplitudes of ground vibrations follows the law of inverse proportionality to the distar from the source of disturbance. The conclusion is reached that Boussinesq theory of the static effects of a concentrated force can be applied to the dynamic case of impact; provided the displacements of particles of the ground near the point of impact are taken into account. - V. S.

7543. Lawrence, R. W. Mechanism of Detonation in Explosives. Geophysics
Menasha, Wis., vol. 9, No. 1, 1944, pp. 1-18.

The detonation of high explosives was investigated in the light of th hydrodynamic theory of detonation. Two properties of explosives were studied, strength and detonation velocity. Moving film photography serve for observations. The films illustrate the nature of detonation waves in explosives and of shock waves in the air, the propagation of detonation from one cartridge of blasting gelatin to another across air gaps and wate gaps, etc. The high temperature of shock waves is confirmed by luminosit in the photographs; in liquids there was no luminosity. Experimentally determined values of the detonation velocity for nitroglycerin, blasting gelatin, and 60-percent gelatin dynamite were found to be in approximate agreement with the calculated values. - V. S.

7544. Leet, L. D. Vibrations from Blasting. Explosives Eng., Wilmingto
Del., vol. 22, No. 2, 1944, pp. 57-61, 82.

During past years the author has studied vibrations propagated throug the ground by blasting. He discusses the characteristics of these vibrations, the apparatus used in their study, and their effects on buildings. The vibrations are elastic waves of several types, traveling with differe velocity. Only a small fraction of 1 percent of the initial energy of a blast is spent in these waves. Of that amount the so-called "surface wave carry 90 to 95 percent. They are, therefore, the only waves that can affe buildings. The solidity of buildings must also be considered; such data a reasonably complete in engineering sciences. Equally complete informatio should be accumulated on the characteristics of vibrations by recording a studying them. This the author has endeavored to do. His data indicate that elastic vibrations can not, and do not, damage structures in the vicinity. Some instances of damage from earthquakes are discussed. Examp of records illustrate the text. - V. S.

7545. Linden, N. A. Seismic Activity in 1939, According to the Observations of Teleseismic Stations of the Seismological Institute of the Academy of Sciences of the U.S.S.R. (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 1-5.

The teleseismic stations of the U.S.S.R. recorded 1,868 earthquakes in 1939. It has been possible to determine epicenters for 213 earthquakes. Among them, 13 earthquakes were very strong and produced destruction, and 12 earthquakes had a focus deeper than normal. The data on the major earthquakes are tabulated. The strongest earthquakes were as follows: Chile, January 25; Solomon Islands, January 30; Coral Sea, April 30; Pacific Ocean to the East of Japan, October 10; Celebes, December 21; and Turkey, December 27. Some of them are briefly described and characterized by examples of records. A map of epicenters of 213 earthquakes accompanies the text. The largest number of epicenters is located in the northern part of the Eastern hemisphere. - V. S.

7546. Masarskii, S. I. The Derivation of Equations for Hodographs of Waves Refracted and Reflected from the Surfaces of n Planar Inclined Boundaries (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 29-41.

Equations are deduced for the hodographs of seismic waves propagated under assumed generalized conditions. The assumptions postulate the depth of n strata with planar dividing boundaries, the angle of inclination of the boundaries, and propagation velocities of seismic waves in the strata; it is further assumed that the angle of inclination and the velocity are constant for each stratum. The trajectory of a wave is divided for purposes of mathematical discussion into 3 parts: (1) The descending ray; (2) the refracted ray; and (3) the ascending ray. The equations are evolved for waves refracted and reflected at the n-th surface. A comprehensive demonstration of mathematical derivation is presented. - V. S.

7547. Mintrop, Ludger. Über Anwendungen des seismischen Verfahrens im Erdölbergbau und ihre wirtschaftlichen und wissenschaftlichen Auswirkungen (On the Application of the Seismic Method to Oil Exploration and Its Practical and Scientific Aspects). Oel u. Kohle, Berlin, vol. 39, No. 10, 1943, pp. 269-287.

The seismic method is discussed with respect to its development and its practical and scientific applications.

(1) The method originated in the discovery of certain artificially generated waves by L. Mintrop in 1919. The underlying principles are described. The first practical application was made by Mintrop, L. Grube, and F. Gries in 1920. About that time the Seismos Co. of Hannover was founded. This organization has carried out extensive seismic exploration in Germany, Egypt, Iraq, Iran, Mexico, and the United States. By 1930 it had covered about 200,000 km.^{2}

(2) The practical applications of the seismic method are presented according to data from the United States. The discovery of the Blue Ridge Boling Dome, Orchard Dome, East Hackberry, Sugarland, etc. oil fields is discussed; travel-time curves and maps of the fields illustrate the text. Statistics on the increase of dome discoveries during 1900-40 show an abrupt rise with the advent of geophysics.

(3) The scientific applications of the seismic method are exemplified by the work of Wiechert, Mohorovicic, Mintrop, Angenheister, Brockamp, O. Schmidt, etc. The Göttingen Geophysical Institute has made seismic measur ments of the thickness of the Alpine glaciers and of the ice in Greenland. The first seismic observations on ice were made in 1922-23 in northern Sweden. Other investigations are mentioned. Travel-time curves and vario data illustrate the text. - V. S.

7548. Ogievich, I. B. The Connections between Several Amplifiers Fed fro a Common Source (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 60-63.

In seismic reflection surveying a use is made of multiple amplifiers fed from common power sources. In such use, complications are created by the formation of new interconnections within the amplifiers - for example, connections through the internal resistances of the power sources. The author discusses this latter instance. A generalized scheme of two amplifiers fed from a common source is presented. The plate currents will produce an alternating intensity in the internal resistance of the plate or B battery feeding all the tubes of both amplifiers. As a result, the second tube will be affected both by a "useful" input intensity amplified by the first stage, and by an "interfering" loss in intensity created by the plat current of the third stage of the effective amplifier. The ratio of the "useful" to the "interfering" intensity is termed the percentage of interference. A mathematical discussion deduces a formula for this percentage of interference. - V. S.

7549. Reich, H. Ergebnisse bei refraktionsseismischen Untersuchungen im Alpenvorland zwischen Inn und Melk (The Results of Seismic Refraction Surveys in the Alpine Foreland between Inn and Melk). Beiträge angew Geophysik, Leipzig, vol. 9, 1942, p. 269.

The German State Office for Land Survey in 1939-41 made seismic refraction surveys along the northern ridges of the Alps, in the upper and lower Danube Basin. The purpose was to clarify the stratigraphic conditic in the Tertiary, which is well-developed in this region. Usable reflectic were not obtainable, and stratigraphic boundaries were determined by means of refractions. The horizons outlined were found to be mostly the results of tectonic forces not necessarily corresponding to stratigraphic horizons they are termed "phantom horizons." Several factors influencing seismic velocities in these surveys are discussed: (1) The elevations of the shot and registration points; (2) diluvial and alluvial coverings; (3) the nature of the Tertiary rocks; and (4) the various conditions of the strata - V. S.

7550. Richter, C. F. Mathematical Questions in Seismology. Bull. Am. Mathematical Soc., New York, vol. 49, No. 7, 1943, pp. 477-493.

Mathematical questions in seismology are reducible to three principal sets of differential equations: (1) Equations of motion of the recording instruments; (2) equations of motion of elastic solid bodies; and (3) equations of propagation of elastic waves in the interior of the earth (usually assumed as spherical). The first set is the simplest, and its theory is well-worked-out. The statistical approach is here important in the treatment of errors; in this connection, H. Jeffrey's method is mentioned. The second set comprises a vector equation and two equations for the components of the stress tensor in terms of the derivatives of the displacement. These classical equations are called for whenever it is necessary to apply boundary conditions. They are cited, and their mathematical consequences, generalizations, and modifications are analyzed. Rayleigh and Love waves and derived plane waves are discussed. The third set comprises equations identical with those of geometrical optics. The chief difference lies in the determinations of time. Fermat's "principle of least time," the "eikonal" equation associated with the variation principle, Snell's law of refraction in its polar form, and other equations of "optical" seismology are discussed. A comprehensive bibliography is appended. - V. S.

7551. Riznichenko, G. V. Seismic Properties of Ground Layers Permanently Frozen (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géog. et Geophys., Moscow, No. 6, 1942, pp. 263-274.

Conceptions relating to the seismic properties of permanently frozen layers, as adopted by various investigators, are critically examined. The work carried out by the author in 1940 has proved that such layers do not interfere with seismic prospecting. On the contrary, a frozen condition sometimes is favorable for interpretation of the results. - W. A.

7552. Ruby, G. M. Petroleum Exploration in Chile. Petrol. Interamericano (printed in Spanish and English), Tulsa, Okla., vol. 2, No. 1, 1944, pp. 81-87.

Corporación de Fomento de la Producción, an agency of the Chilean government, undertook recently to determine whether there is petroleum in Chile. Foreign geophysicists and geologists have directed exploration. Reconnaissance revealed definite promise of commercial deposits only in the extreme south of Chile. The geology of this region is described and discussed. Seismic surveys were made in the drift-covered plains. In the foothills, where outcrops are available, geological mapping was carried out. The results have shown that a drilling campaign is justified. - V. S.

7553. Rudashevskii, G. E. Considerations Regarding the Practical Utilization of Induction Voltmeters (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 91-95.

The principle of the induction voltmeter can be utilized in the construction of electroseismographs and vibrographs for obtaining a larger recording of displacements. Various examples are described of the application of voltmeters in other fields, and samples of oscillograms are shown. - V. S.

7554. Seismological Society of America, Eastern Section. Earthquake Notes (A. K. Ludy, ed.). Washington, D. C., vol. 15, Nos. 3-4, 1944, 7 pp.

Among the notes contained in this issue the following are of broad interest: (1) A possible great earthquake in the State of Washington; (2) a vibration meter with variable period and magnification; and (3) seismic sea waves. - V. S.

7555. Sharpe, J. A. The Effect of Charge Size on Reflection Records. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 131-142.

Examples are presented showing the effect of charge size on: The ratio of the amplitude of reflected motion to that of surface waves; the ratio of the amplitude of reflected motion to that of random interference; the frequency spectrum of reflected motion. The similarity between these observations and the effects of changing depth of shooting are discussed. It is concluded that the use of a larger or a smaller charge in a particular circumstance may be the means of effecting a useful improvement in a record. - Author's abs.

7556. Shnirman, G. L. A Condenser Seismograph for Prospecting by the Method of Refracted Waves (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 49-53.

Seismic refraction surveying imposes special requirements on seismographs due to the long periods of ground oscillation. The electromagnetic and electrodynamic seismographs do not satisfy these requirements because of short period or insufficient sensitivity. Particularly well-suited for long periods is the condenser electroseismograph. Its main deficiency is instability caused by dependence on temperature and batteries. These factors are controlled in the new seismograph constructed by the author at the laboratory of the Seismological Institute of U.S.S.R. The instrument is described. Its principal part is a differential condenser consisting of three rectangular plates. Two external plates are fastened rigidly to the body of the apparatus; the intermediate plate is attached to a vertical pendulum and moves between the other plates with pendular oscillations. The vertical pendulum is suspended on a cylindrical spiral spring with zero initial length. The scheme of electrical wiring is illustrated by a diagram. The apparatus is operated on D. C. current. - V. S.

7557. Short, E. H., Jr. Distant Offshore Seismic Survey Conducted in Gulf of Mexico. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 16, 1944, pp. 87-89.

The Superior Oil Co. has undertaken seismic exploration of the submarine territory of the Gulf of Mexico south of Cameron, La. The work extends 26 miles offshore and to depths down to 45 ft. The equipment, problems, and plan of operations are described. The surveying is carried on from five boats with high maneuverability. The laying out of profiles offers difficulties, particularly in rough waters. Specially designed buoys and floating backsights are used. The geophones are encased in cement jugs with a broad flat bottom. During operations a backsight boat and a chaining boat preceed the two shooting boats and the recording boat. Each time the recording boat is anchored, one of the shooting boats plants the geophones. Then the shooting boats occupy their positions at 2,000 ft. in front and behind the recording boat. Upon receiving a telephone order from the recording boat, each shooting boat fires its charge. The description of the work is illustrated by drawings. - V. S.

7558. Wolf, Alfred. The Equation of Motion of a Geophone on the Surface of an Elastic Earth. Geophysics, Manasha, Wis., vol. 9, No. 1, 1944, pp. 29-35.

The motion of a geophone case placed on the surface of an elastic earth does not follow faithfully the motion of the earth at high frequencies. In effect, a weight placed on the surface of an elastic solid constitutes a damped oscillating system. The elastic restoring forces are determined by the area of contact between the weight and the surface of the solid and by the elastic moduli of the solid. The damping force is due to emission of elastic waves by the oscillating weight. The motion of the solid also contributes to the inertia of the system. Equations are developed for these forces on the assumption that the wave length is long compared to the linear dimensions of the area of contact between the weight and the elastic solid. This leads to a determination of the frequency of oscillation and of the decrement of such a system. - Author's abs.

4. ELECTRICAL METHODS

7559. Bauernschmidt, A. J., Jr. West Ranch Oil Field, Jackson County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 2, 1944, pp. 197-216.

The West Ranch field is situated in the southwest corner of Jackson County, Tex. Like most Gulf Coast fields, it has a structure formed by the movement of deep salt mass. The discovery well was completed in 1938. Since then electrical logs were run in most wells. The field has now nine producing sand zones, most of them of Frio age. The zones are discussed, and samples of electrical logs are shown for a type section and for all nine zones. For a major field, West Ranch is exceptionally free from faulting. - V. S.

7560. Guyod, Hubert. Electrical Well Logging. Part 1: Review of Well-Logging Methods. Oil Weekly, Houston, Tex., vol. 114, No. 10, 1944, pp. 38-50.

This article is the first of a series designed to give complete information on electrical well logging. An introductory review is presented. It covers briefly all existing and suggested logging methods and their subdivisions: (1) Acoustic method; (2) Chemical methods: Insoluble residues, hydrocarbon content of samples, gas detection in mud; (3) Electrical methods: Natural potential, secondary potentials, electrical conductivity of formations, electrical conductivity of drilling mud, high-frequency response, polarization, electrical transient; (4) Gravitational method; (5) Intake method; (6) Magnetic methods: Susceptibility measurements, retentivity measurements; (7) Mechanical methods: Hole calipering, drilling rate, drilling reaction; (8) Optical methods: Optica examination of formations, visual examination of samples, fluorescence of formations, fluorescence of drilling fluid; (9) Radioactive methods: Natural radioactivity, artificial radioactivity; (10) Seismic method; and (11) Thermal methods: Gradient method, evolution method. The physical properties of the rocks, minerals, and fluids logged and the applicability of each method to the important problems of logging are summarized in two tables. General discussion is devoted to basic problems of logging, selection of logging methods, techniques in open holes, special problems, and the future of electrical logging. A bibliography is appended. - V. S.

7561. Guyod, Hubert. Electrical Well Logging. Part 2: Three Dimensional Flow of Electricity. Oil Weekly, Houston, Tex., vol. 114, No. 11, 1944, pp. 34-40.

A clear understanding of electrical logging requires some familiarity wit elementary electrodynamics. In this paper the basic principles of the flow of electricity in the ground are explained by analogies with the flow of fluids i porous media. The discussion covers the flow of water in a pipe, the flow of electricity in a wire, Ohm's law, d'Arcy's law, structure of metals, arrays of nuclei, three-dimensional flow of liquids, and three-dimensional flow of electricity. - V. S.

7562. Guyod, Hubert. Electrical Well Logging. Part 3: The Single-Point Resistance Method. Oil Weekly, Houston, Tex., vol. 114, No. 12, 1944, pp. 44-52

Equations are discussed for calculating the resistance of variously shape electrodes, from a uniform wire to a homogeneous shell. These equations are further applied to computation of the resistance which the ground offers to a current flowing from a spherical electrode to a remote region. A formula is evolved for the resistance of the spherical electrode, showing its dependence on the electrode's radius and the material in which it is located. Only the material close to the electrode can materially affect its resistance. From this formula is derived the single-point resistance method. A spherical electrode is placed in the formation under investigation. The intensity of a current flowing from the electrode into the formation and the voltage drop betwee the electrode and a remote point are measured. The ratio between these two values is computed. Then the resistance of the electrode is determined by multiplying this ratio by the value $4\pi r$, where r is the radius of the electrod The advantages and limitations of this method are discussed. Examples of single-point resistance logs illustrate the text. - V. S.

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7563. Hubbert, M. K. An Exploratory Study of Faults in the Cave in Rock and Rosiclare Districts by the Earth-Resistivity Method. Geol. Survey, Washington, D. C., Bull. 942, pt. 2, 1944, pp. 73-147.

This report is a presentation of the results of an electrical-resistivity survey conducted in the fluorspar-bearing areas of Hardin County, Ill., principally during the field seasons of 1934 and 1935. Gish-Rooney apparatus employing the Wenner four-electrode method of measurement was used. Traverses were run in directions usually transverse to the strike of the dominant systems of faults. In all but two short profiles, the electrode spacing was 100 feet with the measurements made at 100-foot intervals. The line of electrodes was parallel to the line of traverse. Most of the work was done in two districts, one near the town of Rosiclare and the other in the mining district northwest of Cave in Rock. In many cases the presence of faults was clearly indicated. A fault was mapped for a distance of about 2 miles in the alluvium-filled valley of Wallace Branch about 3.5 miles west of Rosiclare. Some of the branches of the Peters Creek fault in the Cave in Rock district were clearly shown. In many other instances anomalies appeared the causes of which were not evident, but they may be related to structural disturbances.

One curious anomaly was discovered at station 83.5 on profile 13 in the Rosiclare district. It suggests an unusual subsurface condition, which warrants further consideration. In the Cave in Rock district a region of marked disturbance was indicated in the northeast part of the resistivity grid, suggesting the possibility of complex fracturing of small displacement favorable to the infiltration of mineralizing solutions. This locality is indicated as being one of the most hopeful prospects of the territory surveyed.

Although the significance of many of the observed anomalies is not clear, it is possible that their existence may provide useful clues for the guidance of direct prospecting. With this in view, not only have the author's own interpretations been presented, but the direct measurements themselves have been plotted in graphical form. - Author's abs.

7564. McCann, G. D., and Morgan, D. E. Field Disturbances Produced by Lightning. Trans. Am. Inst. Elec. Eng., Suppl., New York, vol. 62, 1943, pp. 345-357.

A survey is given of the variation of the earth's electric field during disturbed weather conditions, and in particular due to lightning discharges. With certain assumptions of charge distribution along the channel of the leader stroke and the velocity of propagation of the return stroke, the magnitudes and wave shapes of the individual components of the resulting field changes are determined as a function of the stroke distance, and the effects of varying parameters are investigated. The variation of field changes obtained theoretically is compared with published field observations. The field changes produced by cloud-cloud strokes are discussed. - R. H. G., Sci. Abs., Sect. A, vol. 47, No. 555, 1944.

7565. Tolkachev, M. The Findings of Electrical Surveys in the District o
Soligalich, Province of Iaroslavl' (in Russian). Razvedka Nedr, Moscow, vol. 11, No. 3, 1941, p. 29.

An electrical resistivity survey has been made in the Soligalich district, in eastern central Russia. It was carried out in keeping with the proposed geophysical exploration of central Russia for oil, planned in 1939. Soligalich was selected because an anticline had been discovered here previously. The survey revealed a NE.-SW. zone of high electrical resistivity. The three focal anomalies in this zone lie on a straight li and exceed 300 ohm-cms. Among them the anomaly westward from Soligalich i the most pronounced. Electrical resistivity sharply declines NW. of the zone, indicating a dip of the main strata. The findings are embodied in a structural map. The Soligalich structure should be interpreted as a brach anticline, a type of fold frequent in the eastern part of the central Russian plateau. Tentative conclusions are made concerning the stratigraphic position of the horizon of high electrical resistivity in the explored region. - V. S.

7566. Way, H. J. R. Reef Prospecting by the Resistivity Method in Uganda
Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1676, 1944, 17 pp

In 1937-39 the Busia gold field in the reef country of eastern Uganda was explored by the resistivity method. Disintegrated reefs in the thin laterite near the surface made the prospecting uncertain. A Gish-Rooney arrangement of potentiometer and equipment was used; the instruments are described. Notwithstanding unfavorable conditions, very satisfactory resistivity curves were obtained; they are analyzed and illustrated by exam The diversity in their shapes and characteristics suggests a relationship between the electrode separation, width of reef, and a constant of the co sponding curve. Departures from standard curves are explained by the pecu geology of the reefs and the associated float masses. The survey located three new veins; only one contained enough gold to warrant further exploration. - V. S.

5. RADIOACTIVE METHODS

7567. Bliss, A. D. Radioactive Substances. III. The Analysis and Age o
a North Carolina Monazite. Am. Jour. Sci., New Haven, Conn., vol. 2
No. 6, 1944, pp. 327-330.

A monazite from Spruce Pine, N. C., has been analyzed for thorium (4. percent), uranium (0.02) percent), and lead (0.13 percent). The age as calculated by the customary formula is approximately 600 million years. - Author's abs.

7568. Campbell, J. L. P. Gamma-Ray Logging in East Texas. Petrol. Eng.,
Dallas, Tex., vol. 15, No. 4, 1944, pp. 156-158.

Work-over estimates in East Texas usually include gamma-ray surveys. The principles of such logging are indicated, and three examples of its application and interpretation are given: (1) Log of a well in Upshur County through one string of casing; (2) well logged through chalk section having liner on bottom overlapping oil string; and (3) well near Gladewater logged in both open hole and cased hole. An intercorrelation of gamma-ray logs and their comparison with electrical logs can furnish additional useful information. - V. S.

7569. Curtiss, L. F., and Davis, F. J. A Counting Method for the Determination of Small Amounts of Radium and of Radon. Jour. Research, Nat. Bureau of Standards, Washington, D. C., vol. 31, No. 3, 1943, pp. 181-195.

A method for determining small quantities of radon is described, in which the alpha particles from radon, RaA and RaC are counted in an ion-counting chamber. Details of an arrangement for automatically making a printed record of the hourly totaled count are given. Advantages of this method over that using an ionization chamber with electrometer are discussed. - Author's abs.

7570. Howell, L. G. Gamma-Ray Measurements in Oil Wells. Electronics, Albany, N. Y., vol 17, No. 3, 1944, pp. 130-133, 286.

Electronic equipment is used in geophysics for gamma-ray logging, Geiger-Müller counter measurements, and radioactive cement tracing. (1) Gamma-ray logging can be made irrespective of casing and metallic pipes. Radioactive elements include the uranium series, throium series, and potassium. The essentials of the technique are outlined. (2) The Geiger-Müller counter method uses counter tubes as detectors. Pulses from individual secondary particles produced by gamma rays are "counted" in the G-M tube. The method is discussed, and comparisons are made between electric and electronic logs. (3) Radioactive cement measurements are an application of gamma-ray logging. A tracing is made in oil wells of cement made radioactive by the addition of carnotite ore. The gamma-ray curve is compared with a temperature log of setting cement. Several examples of electrical logs, electronic logs, and a temperature log illustrate the text. - V. S.

7571. Kalapesi, A. S., Chhapgar, S. K., and Sukheswala., R. N. The Age of the Rajmahal Traps and Some Neighbouring Dike Rocks by the "Lead-Ratio" Method. Quart. Jour. Geol., Min. and Met. Soc. India, Calcutta, vol. 15, No. 3, 1943, pp. 127-132.

Specimens of basalt, dolerite dikes, and mica peridotites, gathered in India from the Rajmahal Hills and the coal-fields of Raniganj, Jharia, and Giridih, have been studied by means of the "lead-ratio" method to determine their geological age. The occurrence, distribution, and stratigraphy of these rocks are described. The results were obtained by analyses for uranium, thorium, and lead. (1) The age of the Rajmahal Hills is found to be 22.8 million years; this age cannot be considered conclusive because only one specimen was available. (2) The five dikes in the coal fields have an ag between 30.4 and 83.6 million years. The latter figures show that the dikes in the coal fields are distinct from the Rajmahal flows and form su sequent intrusions probably connected with the Deccan traps. Thus, the "lead-ratio" assigns a Tertiary age to the dikes and refutes the Jurassic age attributed to them on the basis of their geographic proximity to the Rajmahal Hills. - V. S.

7572. Keevil, N. B. Thorium-Uranium Ratios in Rocks and Minerals. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 6, 1944, pp. 309-321.

100 recent determinations of thorium-uranium ratios, including some new data, are assembled and plotted in frequency-distribution curves. A probable value of 3.2 is indicated for basic, acidic, and intermediate rocks, but regional grouping of the results suggests that the ratio may b as high as 3.5. Independent confirmation that the Th/U ration lies withi this range is obtained from Nier's determinations of abundances of lead isotopes from samples of ore-lead. For most purposes a constant value of 3.2 may be assumed for the Th/U ratio. This leads to no significant erro in alpha-counting theory, in determinations of the rate of production of radiogenic heat, or in determinations of the rate of accumulation of heli and lead in rocks. The results do not support Holmes' theory of the gene of lead ores from a deep-seated source. - Author's abs.

7573. Komlev, L. V. The Age of the Pegmatite Dikes of North Karelia (Ab Internat. Geol. Cong., 17th sess., U.S.S.R., 1937; Abs. of papers, Moscow, 1937, p. 195.

Geological data place the North Karelian pegmatite dikes among the youngest formations of the White Sea series, but the data of radioactive disintegration class them among the most ancient known so far. The autho describes the conclusive features of the radioactive method, such as the sharply manifested differentiation of elements, the multiphase character uraninite formations, the constancy of ratios of lead to uranium, and the almost equal value of lead ratios for uraninite and monazite. He conclud that the radioactive measurement seems to be the more accurate determinat of the two. Accordingly, the pegmatite dikes of North Karelia must occup a very early chronological position in the pre-Cambrian series. - V. S.

7574. Lane-Wells Co. Lane-Wells Radioactivity Well Logging. Lane-Wells Co., 5610 South Soto St., Los Angeles 11, Calif., 52 pp.

The Lane-Wells Co. has issued a bulletin discussing the nature of rad activity and the applications of radioactivity logging to problems of the petroleum industry. Typical curves and sections are reproduced from nea all the principal oil areas in the United States. Methods and techniques are outlined for application to work-over and remedial programs. The publication is considered the most complete text to date covering actual field experience in radioactivity logging. - V. S.

7575. Russell, W. L. The Total Gamma-Ray Activity of Sedimentary Rocks as Indicated by Geiger-Counter Determinations. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 180-216.

Geiger-counter determinations of the gamma-ray intensity of 510 rock samples have been made to determine the average radioactivity and frequency distribution of radioactivities of the various types of sedimentary rocks. The results, expressed in units of gamma-ray intensity, show that limestones, sandstones, and dolomites are of relatively low radioactivity, shales much higher, and black bituminous shales highest of all. The new data on the gamma radiation of the sediments may be used to improve the interpretation of radioactivity logs and to determine the value of surface radioactivity surveys. - Author's abs.

7576. Seaborg, G. T. Table of Isotopes. Rev. Modern Phys., Lancaster, Pa., vol. 16, No. 1, 1944, pp. 1-32.

This table presents a complete list of all the artificial and natural radioactive isotopes and stable isotopes known before June 1, 1944. It gives also important features associated with them, atomic numbers and mass numbers, the degree of certainty of each assignment of a radioactive isotope, the percentage abundance of the stable isotopes, the type of radiation (negative beta-particles, positive beta-particles, gamma-rays, alpha-particles, etc.), half-life, energy of radiation in Mev., and the observed nuclear reactions. The table is accompanied by a list of references, providing in most cases a key to the complete literature. - V. S.

7577. Sheppard, C. W. Radioactivity and Petroleum Genesis. Bull Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 7, 1944, pp. 924-952.

The conversion of organic substances to petroleum in the sedimentary environment is discussed. The present available information is reviewed concerning probable source materials and the conditions of deposition. The significance of the porphyrin content of petroleum is reviewed. An outline of the thermodynamical and kinetic aspects of petroleum conversion is given. As a possible activating agent the radiations from radioactive materials in sediments are selected for discussion. A survey is made of the pertinent literature on known chemical reactions produced by alpha-particle bombardment. Possible mechanisms are mentioned whereby alpha particles may cause molecules to react chemically. Approximate calculations are made of the efficiency of conversion of organic material to petroleum by alpha-particle bombardment under certain hypothetical sedimentary conditions. These calculations show that the rate of conversion is highly dependent upon the relative association in the sediment between the organic material and the radioactive constituents. In a uniform, homogeneous sediment containing 2.5 percent organic matter and having a concentration of 2.7×10^{-6} gram of uranium and 8×10^{-6} of thorium per gram, approximately 2/5 of the total organic content may be converted in 100 million years. Due to the uncertainty in the available data no definite conclusion may be made as yet as to the importance of sedimentary radioactivity in petroleum genesis. - Author's abs.

7578. Zwerger, R. von. Über weitere Erfahrungen mit radioaktiven Messungen in Bohrlöchern (Concerning Further Experiences with Radioactivity Measurements in Boreholes). Oel u. Kohle, Berlin, vol. 39, No. 43/44, 1943, pp. 935-941.

The progress of radioactive logging in boreholes during 1939-42 is described, including instruments, intensity of the gamma-radiation of rocks, trials of neutron-logging, and problems of interpretation. Both geological and production aspects are considered. American literature supplies a substantial part of the source material. The text is illustrated with examples of logs. - V. S.

6. GEOTHERMAL METHODS

7579. Kraskovsky, S. A. Geothermal Measurements in Oil and Salt Fields (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 30-44.

The geothermal measurements in Russian oil fields were comparatively numerous. The author reports 78 surveys during 1906-38 in the major fields of the Caucasus, Groznyi, Don Basin, Ural Mountains, Kazakhstan, etc. He describes and analyzes problems, methods, and instruments and presents data on the depths of measurements, the temperatures, and the geothermal gradients. Geological profiles and curves of temperature-change with depth illustrate the text. In the reviewed surveys the depth of measurements ranged from 56.7 to 1,200 meters. The results show a variation of geothermal gradients from 7.5 to 108.1 m/C°; in one doubtful case the gradient was 130.4 m/C°. Some conclusions are given. The comprehensive survey of the Groznyi district made by Iachevskii in 1913 has led him to conclude that the thermal picture of this oil region is different from that of regions containing no oil. A survey of the Novogroznenskii district indicated that high temperatures were associated with boreholes containing little oil but much water. A survey of the Verkhnechusovskii oil field by the author in 1934 showed that boreholes on the boundaries of a subsurface structure have higher temperatures than boreholes near its apex; he considers prolonged production the cause. Other observations are mentioned. - V. S.

7580. Taylor, N. W., and Noyes, Bradford, Jr. Aging Thermometers. Pennsylvania State College, Mineral Ind. Exp. Sta., Tech. Paper 92, 1944, 6 p.

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During the long-time aging of thermometers at constant temperature, the change in readings of a fixed point, such as the ice point, normally follows an exponential law, $y = a(1-e^{-mt})$. Methods are described for the evaluation of the total expected change, a, of the relaxation time, $1/m$, and of the half-life period, $H = 0.693/m$. Examples are given and calculations are made of the expected change remaining after any aging time, t. It is believed that the exponential law is due primarily to bulb shrinkage under the influence of a single molecular mechanism in the glass. Some examples are presented of anomalous behavior, such as reversals in the direction of change. This phenomenon is shown to be a general one in glass, and an interpretation is given in terms of several molecular processes which operate at one time but with different characteristic rates. An expression is derived for the calculation of change of density in glass, based on experiments in which the glass is in the form of a thermometer. The methods of mathematical analysis described in this paper are useful for evaluating the effects of accelerated aging treatments on glass. - Author's abs.

7. GEOCHEMICAL METHODS

7581. Chin, Y. H., and Juan, V. C. On the Possible Oil Fields in Szechuan as Indicated by Isocarb Lines. Bull. Geol. Soc. China, Pehpei, Chungking, Szechuan, China; vol. 20, Nos. 3-4, 1940, pp. 357-367.

The Red Basin of Szechuan in China shows many indications of oil, but it is not known in what areas oil can be found in commercial quantities. The present paper describes a preliminary survey by means of carbon ratios. The carbon-ratio theory is outlined. It maintains that the character and composition of coals in formations are influenced by the presence of oil and can serve as a guide for detecting the oil. The stratigraphy of the Red Basin is discussed. It leads to the conclusion that the widely distributed Hsiangchi coal series is the only coal formation suitable for the carbon-ratio method. Numerous analyses of these Jurassic coals had been made previously and were available for the survey. They provided the data for plotting isocarb lines. These data and the method of plotting are described. It is concluded from the isocarb maps, as well as from source beds, reservoir rocks, favorable structures, etc., that the Lungchang-Jungchang area offers the greatest promise of oil. The Weiyuan-Chienwei area and the Yungchuan-Chiangtsin area are possible, but the Tzeluching-Kungching and the Pahsien-Changshou areas are quite unfavorable. - V. S.

7582. Seismograph Service Corporation. Well-Logging Laboratory. World Petrol., New York, vol. 15, No. 5, 1944, p. 75.

The Seismograph Service Corporation, Tulsa, Okla., has designed a portable laboratory for mud analysis during well drilling, with a view to detecting oil-bearing horizons. This laboratory is mounted on a 1-1/2-ton truck or trailer and is operated by three engineers. For mud tests, the drilling fluid is continuously sampled and pumped to the laboratory. The gas liberated from the mud mixes with the air stream and is indicated by a gas detector. Samples for oil detection are taken periodically and examined under ultraviolet light. Together with the mud analysis, a log is plotted of the following data: (1) The presence of oil and gas in the formation; (2) the exact depth of the test; (3) the drilling rate; and (4) the depth of the gas-oil contact. The description of the laboratory is illustrated by a drawing. - V. S.

7583. Tageeva, N. V. Fluorine and Boron in Natural Waters and Their Bearin on the Occurrence of Petroleum. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 34, Nos. 4-5, 1942, pp. 117-120.

The author seeks to verify by means of geochemical analysis the hypothesis of L. V. Khmelevskaia that intrusive masses can affect oil formation. She presents experimental data on the fluorine, boron, and phosphorus content of different natural waters, including oil-field waters. From this material it is apparent that the alkaline oil-field waters are connected with magmatism. Thus, magmatism must play a part in the formation of Cenozoic oil deposits. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7584. Barsch, O., and Zwerger, R. von. Erdölgeophysikalische Untersuchung im europäischen Teil der Sowjetunion (Geophysical Exploration for Oil in the European Part of the Soviet Union). Oel u. Kohle, Berlin, vol. 38, 1942, p. 1411.

An outline is given of Russian oil exploration after the first World War, region by region.

(1) In the Crimea-Caucasus lowlands gravimetric measurements served fo delineating tectonic boundaries and synclines. In the Baku and Grozny districts seismic and electric methods were used for detecting subsurface anticlines. The Grozny district was first surveyed gravimetrically.

(2) In the northern part of the Crimea-Caucasus region the Pliocene is very well-developed; it has been explored particularly attentively in its entirety. The Maikop-Kuban area was surveyed by seismic reflection measurements for delineating sand sections and determining monoclinal structures near the Caucasus Mountains. On the Kerch Peninsula electrical resistivity measurements were made.

(3) Between the Donets region and the lower Volga, pendulum measurements have led to the detection of the southeastern ramifications of the Donets Mountains which were covered by a strong Tertiary-Cretaceous formati 400 to 500 m. thick.

(4) In the Ukrainian and pre-Caspian regions, surveys were made by various geophysical methods; the work is illustrated by sketch maps, profil

and examples. The Caspian depression was the subject of especially comprehensive regional gravimetric explorations. This area is underlain by some 1,500 to 1,600 salt domes indicated by gravity-minima producing disturbance amplitudes of 15 to 35 mgl.

(5) In the "Second Baku" region between the Volga and the Urals a large number of promising structures has been discovered by geophysical methods. - V. S.

7585. Bazzoni, C. B. A Synopsis of Three Lectures on Modern Applied Geophysics. Bull. Wagner Free Inst. Sci., Philadelphia, vol. 19, No. 2, 1944, pp. 17-23.

A brief account is given of the gravitational, magnetic, seismic, electrical, radioactive, and logging methods with respect to field work, instruments, interpretation of data, relative advantages, etc. The different variations of methods and various special techniques are indicated. - V. S.

7586. Colbert, L. O. Geophysical Measurements in the American Republics. Sci. Monthly, Washington, D. C., vol. 58, No. 6, 1944, pp. 435-443.

The United States and Geodetic Survey has carried on geophysical work in Latin-American republics in pursuance of the good-neighbor policy. The work included gravity determinations in Colombia and Peru; the establishment and maintenance of 14 automatic tide gages in 8 republics; magnetic observations in all 20 republics; cooperation in seismological work; arrangements for the exchange of personnel to assure standardized methods of observation; and translation into Spanish of several manuals on these geophysical operations. These activities are described. Particular attention was devoted to geomagnetism marked by unusual features in South America. The magnetic equator, which crosses South America about 10° south of the true equator, has been slowly moving southward. It is important to know whether this trend is continuing, especially as it may be related to movement of the magnetic poles. Other magnetic conditions in South America are likewise of interest. As a part of the work, the new volcano Paricutin in Mexico was surveyed magnetically 3 months after the first eruption, while it was still building up its cone and extending its lava field. - V. S.

7587. Cotton, L. A. The Constitution of the Earth's Interior. Australian Jour. Sci., Sidney, vol. 6, No. 4, 1944, pp. 101-104.

The constitution of the earth's interior cannot be studied directly but must be reconstructed from the evidence supplied by many different sciences. The author reviews briefly the contributions of geology, geodesy, astronomy, celestial mechanics, study of meteorites, and particularly, seismology, which furnish knowledge of the outer crust, shape of the earth, density, elasticity, distribution of discontinuities, etc. The theoretical earth thus pieced together has been tested and is found to conform to all

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known scientific requirements. It gives the best picture available with the present evidence. - V. S.

7588. Davidson, Stanley. Modernized Exploration Technique in Eastern Canadian Mining Fields. Canadian Min. and Met. Bull., Montreal, No. 381, January 1944, pp. 49-52.

The present exploration technique in eastern Canada should be moderni
by supplementary geological mapping, geophysical surveying, and pilot dia
drilling. The benefits of such modernization are illustrated by the follow
examples. (1) Sudbury district: International Nickel and Falconbridge ha
made geological plane-table maps of the rim of the Sudbury nickel basin, t
Frood, Copper Cliff, Foy, Worthington, and Frood-Stobie offsets, and the
Creighton surface. Then geomagnetic surveys were carried out. As a resul
a number of ore bodies were discovered. (2) Noranda district: Plane-tab
geological surveys were made at Pelletier Lake and on the property of Lak
Durault Mines, near the Amulet "A" ore body. They revealed an upper
rhyolitic horizon. - V. S.

7589. Ebbley, Norman, Jr. Oil Seepages on the Alaskan Arctic Slope. Min
and Met., New York, vol. 25, No. 453, 1944, pp. 415-419.

Oil certainly exists along the Arctic coast. The question is, how mu
and can we get it out economically. To find just where the oil exists an
how much will require extensive core drilling and geological studies. Ge
physical techniques are not so well-adapted. The climate and living cond
tions are terrible, as the author makes clear. But oil men are not the s
to let physical discomforts deter them - only it's usually heat and humid
rather than cold that they have to fight. - Author's abs.

7590. Gallie, J. F. History of the Society of Exploration Geophysicists
Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 238-242.

A brief history of the Society of Exploration Geophysicists is presented. It describes its formation in 1930 on the initiative of D. C. Barton, the adoption of a constitution and bylaws, election of officers,
presentation of papers, growth of the membership (totaling 1,001 members
in 1943), amendment of the constitution in 1935, foundation of a journal
financial status, etc. This account is accompanied by a text of the constitution and bylaws and the membership list as of March 1944. - V. S

7591. Howard, W. V. Prospecting for Stratigraphic Traps. Petrol. Inte
americano, (printed in Spanish and English), Tulsa, Okla., vol. 1,
3, 1944, pp. 59-61.

In stratigraphic and erosional traps a structural closure exists on
fewer than four sides. The remaining sides are characterized by a disap
ance of porosity. The author analyzes four types of such traps, with a
to prospecting possibilities.

(1) **Traps with structure** on three sides are the simplest; search for such oil accumulations follows seven essential steps which are described.

(2) Traps with structure on two sides are very uncommon; they are not discussed.

(3) Traps with structure on one side are typical of the occurrence of oil in a bay on an old shore line; drilling at a long or short distance above the normal line of pinchout, which is very costly, constitutes almost the only way of finding them.

(4) Traps with no structural closures on their sides are typified by shoestring sand deposits; these deposits have usually a convex upper surface forming a sort of pseudo-structure discoverable by surface mapping.

The author concludes that successful search for stratigraphic traps is at present confined to those which are located on structure or are intersected by structural trends. Exploration made down the flanks of structures or along shore-line trends has a probability of success between 1 in 5 and 1 in 20. - V. S.

7592. Howe, H. V. Use of Paleontology by the Oil Industry. Jour. Sedimentary Petrology, Tulsa, Okla., vol. 13, No. 3, 1943, pp. 105-107.

This paper discusses briefly various uses which have been made of paleontology by the oil industry in the past. Present uses of paleontology in correlation and sedimentation studies are discussed. Suggestions are made as to how paleontology can be of added value as an aid in the finding of petroleum. - Author's abs.

7593. Illing, V. C. Education and the Petroleum Industry. Jour. Inst. Petrol., London, vol. 29, No. 238, 1943, pp. 259-283.

A part of this paper is devoted to exploration. The view is expressed that in the search for oil cooperation between geophysics and geology is a prime condition of success. The author stresses cooperation because geophysics and geology have been often regarded as rivals. The differences go back to methods of training. The physicist is trained to measure with great accuracy, while the geologist is interested in historical perspective. Actually, neither can work without the other. The physicist possesses the only tools for direct measurement into the earth; but the results he obtains must be presented in geological terms. The true function of geology is to eliminate unnecessary risks, to balance main chances, and to interpret findings. The author further stressed that geology is not the only branch of science that must cooperate with geophysics. As the discoverable oil fields become fewer and more deeply buried, the task of finding them requires the assistance of ever-broader fields of knowledge. As a result, the geophysicist must satisfy two almost contradictory demands - a broad basis of scientific knowledge and a high degree of specialization in one direction. These

demands can be reconciled if the first is made the prime object of educat
and the second is built up largely by experience. - V. S.

7594. Isham, C. A. The Role of the Geophysical Engineer. Min. Jour.,
Phoenix, Ariz., vol. 27, No. 10, 1943, p. 7.

Some geophysicists are now turning their attention to mining and the
search for ores. They assist mining engineers and geologists by mapping
mineral-bearing regions and indicating potential ore bodies. Such maps a
then verified by core drilling. Propsecting with core drills guided by g
physical maps effects a great saving in expense, time and effort. - V. S.

7595. Lerici, C. M. Alcune considerazioni sull'avvenire della prospezio
geomineraria (Some Considerations on the Future of Prospecting for
Minerals in the Earth). Riv. Geomineraria, vol. 3, Nos. 3/4, 1942,

A comparison is made between the State-controlled organization of ge
physical exploration in Germany and the free-enterprise organization of s
exploration in the United States and Canada. The role of the Government
the planning and execution of large programs of geophysical surveying is
discussed. Attention is then devoted to specialization in various branch
of geophysics, the improvement of instruments, the choice of personnel, a
the future of geophysical exploration. - V. S.

7596. Montana Oil Journal. Geophysics Aids Wildcatters. Great Falls,
Mont., vol. 24, No. 9, 1944, p. 4.

F. H. Lahee has reported to the convention of the American Associati
of Petroleum Geologists that 17 percent of the 3,843 wildcat wells drille
in 1943 were productive. When geophysics played a part in locating wildc
21.4 percent of the wells were productive; when geology had a part, 18.0
percent were productive. It should be kept in mind, in appraising these
figures, that the geologists use geophysics, and the geophysicists use
geology in their work. - V. S.

7597. Pospelov, P. A. A Combined West-Siberian Geophysical Expedition
Searches for Oil (in Russian). Razvedka Nedr, Moscow, vol. 10, Nos.
10-11, 1940, p. 73.

The main West Siberian oil fields are listed, and the utterances of
prominent men favoring geophysical exploration of this region are cited.
The sending of an expedition in 1939 is described. Its purpose was princ
pally to outline the relief of the deep-set Paleozoic covered with heavy
younger sediments and to make all preparatory work for the drilling of 3
4 structures. The areas assigned comprised the districts of Sverinogolov
Petropavlovsk, Gankino, and Tavda. The work included gravimetric, seismi
magnetic, and electrical measurements. The main results were the determi
nation of a number of Paleozoic structures. Most promising among them ar
the structures at Assanovo, Gankino, Riavkino, and Tavda. - V. S.

7598. Ramirez, J. E. El instituto geofisico de los Andes Colombianos (The Geophysical Institute of the Colombian Andes). Rev. Acad. Colombiana de Ciencias Exactas, Fisicas y Naturales, Bogota, vol. 5, N. 19, 1943, pp. 361-366.

This account on the Geophysical Institute at Bogota, Colombia, describes the inauguration of the institute, the seismological station and its instruments, the meteorological observatory, the objectives and importance of the work, and the results obtained during April - September 1943. - V. S.

7599. Rowe, R. C. Finding a Hidden Ore Body. Canadian Min. Jour., Gardenvale, Quebec, vol. 66, No. 1, 1944, pp. 5-9.

The Aldermac Copper Corporation has found an ore body in the Eastern Townships, Quebec Province. This is the first Canadian discovery of a buried ore by combined geophysical and geologic methods. In 1942 a geological map was prepared of the fault zone between the Eustis mine and the Weedon mine. Certain areas were then selected for detailed geophysical exploration. The self-potential method was used for the initial reconnaissance traverses and the resistivity method for checking anomalies. In Ascot Township a strong anomaly was encountered, but there was no surface outcrop. An 8 foot-deep trench gave only rusty schist, but a shallow diamond drill hole showed a complex ore composed of chalcopyrite, sphalerite, galena, and pyrite, carrying gold and silver. In other selected areas, schisted zones were discovered to blend into a graphitic slate ill-fitted to the self-potential method. A gravimeter was brought in for determining whether anomalies detected by electrical methods were due to a graphitic shale or a sulphide body. - V. S.

7600. Sidwell, Raymond. Aid of Sedimentary Petrology to the Discovery of Oil. Jour. Sedimentary Petrology, Tulsa, Okla., vol. 13, No. 3, 1943, pp. 112-116.

The importance of sedimentary petrology to the discovery of oil is reflected in its wide utilization by the oil companies. It is the source of numerous criteria which constitute the basis for subsurface correlation. The study of sediments is considered paramount for the determination of porosity, for successful acidizing, and for information that can be used at the time of drilling. - Author's abs.

7601. Stearn, N. H. Birth of the Science of Exploration Geophysics: 1944. Min. and Met., New York, vol. 25, No. 449, 1944, pp. 262-263.

The development of techniques for the discovery of natural resources is briefly outlined. At first, prospectors were guided by surface indications; then the assistance of geology was sought. When the usefulness of these aids was largely exhausted, the prospectors turned to scientific instruments with which to probe beneath the surface of the earth. So far the application

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of these instruments has been to a considerable extent a groping process, similar to the gestation periods in other experimental sciences. But now the time is approaching when the accumulated body of tested knowledge will crystallize into an organized science of exploration geophysics. Three ma results should be expected from this new science: (1) Search for natural resources; (2) devising improved tools and methods; and (3) development of body of knowledge in keeping with growing demands. - V. S.

7602. Subkow, Philip. Geometrical Orientation of Cores. Oil and Gas Jou
Tulsa, Okla., vol. 43, No. 5, 1944, pp. 79-88.

Information on the direction and dip of formations is valuable in nu ous problems; 10 problems are cited. Several methods have been suggested determining the subsurface dip: Orientation of core barrels, magnetic orientation, and combined electrologging and coring. A new method is now presented which depends upon the geometric properties of deviated cores. Two cores must be taken in the formation surveyed. The direction and inc nation of these cores and the apparent dip of the core stratum must be kn The core axes should differ either in direction or in inclination, or in Then three steps are necessary: (1) Both cores are oriented by placing t core axes in their original directions; (2) each core is further rotated about its axis until the core strata of both cores are parallel; and (3) finally, the direction and dip of the core strata are determined for this parallel position. The underlying geometrical principles are explained, two examples are discussed. A special apparatus serves for orienting cor Drawings of curves and pictures of the apparatus illustrate the text. - V

7603. Wir, S. M. Geophysical Exploration in Poland. Geophysics, Menash
Wis., vol. 9, No. 2, 1944, pp. 143-159.

Geophysical exploration in Poland started in 1923 and continued unti 1939. The work during 1923-37 has been described by Z. Mitera (see Geoph Abs. 95, No. 4703). The present paper amplifies information on seismic e ploration during 1934-37 and describes the activities during 1938-39.

(1) The seismic work of 1934-37 was made in the foreland area divisi into the northern belt adjacent to the Podolian plateau, the median folde belt, the southern belt adjacent to the Carpathian Mountains, and the Carpathians themselves. The parties were equipped with American-made ge phone sets. The surveys gave a contour map of the marker bed formed by gypsum, anhydrite, and limestone of Cretaceous age, throughout most of t area of the foreland.

(2) The geophysical exploration of 1938-39 included seismic surveyi by refraction and reflection methods in the Carpathian Mountains, Carpat foreland, and parts of northwestern and central Poland. The other work sisted of magnetic and gravimetric surveys; the latter used mostly Thyss gravimeters. The area surveyed and the number of stations established a indicated. - V. S.

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9. NEW PUBLICATIONS

7604. Bock, R. Praxis der magnetischen Messungen (The Practice of Mangetic Measurements). Verlag Gebrüder Borntråger, Berlin, 1942.

For a long time magnetic measurements have been used in the search for iron. After the First World War, however, the application of magnetic exploration was much broadened. Entire regions were covered by magnetic surveys because they yielded information valuable in numerous problems, especially in conjunction with gravimetric data. The present book is written with a view to this wider application of magnetic methods. It assembles all knowledge useful for making magnetic measurements. The exploration geophysicist will find particular interest in the chapters devoted to the magnetic variometer of Schmidt; they provide information sufficient for field work. The text is supplied with many tables aiding magnetic determinations. - V. S.

7605. Carnegie Institution of Washington. Year-Book No. 42, July 1, 1942 - June 30, 1943. Washington, D. C., 1943, 208 pp.

The Year-Book No. 42 of the Carnegie Institution compriese two reports on geophysical work:

(1) Geophysical Laboratory, L. H. Adams: Customary activities have been discontinued, and all efforts have been applied to the war. This work is carried out under contracts between the Institution and the Office of Scientific Research and Development. During the last year the program has been expanded. At the same time, a few papers were published on the previous work of the laboratory; abstracts of these papers are included.

(2) Department of Terrestrial Magnetism, J. A. Fleming: The services of the Department have been largely devoted to military work. They have expanded with the progress of the war. Many results obtained in connection with the war will have a great peacetime value. The past year has emphasized the increasing importance of the observatories for various investigations. Most ordinary work was maintained, at least in part, so that the loss of continuity in accumulating data is not too serious; regrettably, cruises of the British Admiralty magnetic survey vessel "Research" had to be discontinued. The outline of the year's work covers the following fields: (1) Cosmic relations; (2) geomagnetic investigations; (3) terrestrial electricity; (4) ionosphere, (5) nuclear physics; (6) observatory and field work, and (7) miscellaneous. - V. S.

7606. Coast and Geodetic Survey, U. S. Department of Commerce. Progress Report on Strong-Motion Earthquake Work; January, February, March, 1944. MSP-48, Washington, D. C., 1944, 2 pp.

A report is made on the following activities:

(1) Seismological field survey: San Francisco Office's questionnaire program; strong-motion work; vibration work; listing of principal earthquakes.

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(2) Lake Mead seismological party: Servicing seismographs, determination of epicenters, etc.

(3) Washington Office: Furnishing information on earthquakes to vari agencies, work on special projects, analysis of accelerograms, etc. - V. S

7607. Coulson, C. A. Waves, A Mathematical Account of the Common Types Wave Motion. New York, Interscience Publishers, Inc., 1943, 156 pp. Price, $1.75.

An elementary analysis is given of the following types of wave motic (1) Waves on strings, (2) waves in membranes; (3) longitudinal waves in b and springs; (4) waves in liquids; (5) sound waves; and (6) electrical wa

In almost every case the fundamental problem is to solve the standar equation of wave motion; the various applications differ chiefly in the c tions imposed upon the solutions. For this reason, the treatment of waves made as unified as possible. A special chapter deals with the equation o wave motion proper. At the end, general consideration is devoted to rela problems, such as Doppler effect, amplitude modulation, group velocity, motion of wave packets, retarded potential theory, etc. - V. S.

7608. Doetsch, Gustav. Theorie und Anwendung der Laplace-Transformation (Theory and Application of the Laplace Transformation). New York, D Publications reproduction Julius Springer's 1937 ed., 454 pp., 18 il Price, $3.75.

This book gives the theory and applications of the Laplace transform method. The material, selected from several fields, is presented for the first time in a unified form.

(1) The theoretical part covers the general theory and histroy of th Laplace transformation, fundamental conceptions of function theory, defin tions and analytical properties, L-functions, inversion formulas, represe tion of operations, mapping of series developments of particular function transfer of series expansions, different types of asymptotic behavior of functions, integral equations, etc.

(2) The applications of the Laplace transformation comprise ordinary differential equations, partial differential equations, equation of heat conduction, telegraph equation and wave equation, potential equation, equ tions with variable coefficients, Huygens' and Euler's principles, etc. book includes a German-English glossary. - V. S.

7609. Hart, C. A. Air Photography Applied to Surveying. New York, Long Green & Co., 1943, 366 pp. Price $7.50.

Among the practical applications of the air survey the author lists geological prospecting. The air survey provides here a topographical map and enables the geologist to plot his observations directly on it. A system of fualts, fractures, dykes, shear zones, etc., is frequently apparent in the photographs while remaining imperceptible to the closer observer. To interpret air photographs from a geological angle, it is necessary to view them ecologically. The greatest value is obtained in the most difficult areas. The author deals with survey methods, interpretation, principles of photography, perspective, stereocopy, plotting, methods of leveling and countouring from air photographs, preparation of maps from photographs, stereoscoping instruments and plotters, small-scale mapping, flying, etc. Numerous photographs and diagrams illustrate the text. The war has greatly advanced air surveying. - V. S.

7610. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U. S. A. Table of Reciprocals of the Integers from 100,000 through 200,009. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, technical director. New York, Columbia University Press, 1943, 201 pp. Price $4.00.

Tables of reciprocals of the integers are useful in computations with calculating machines because they make it possible to use mulitplication in performing an indicated division. The present table facilitates the interpolation of reciprocals by expanding tenfold the scope of the existing tables in the interval from 100,000 through 200,009. A list of the other publications of the Mathematical Tables Project is appended. - V. S.

7611. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U. S. A. Tables of Circular and Hyperbolic Tangents and Cotangents for Radian Arguments. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, technical director. New York, Columbia University Press, 1943, 410 pp. Price $5.00.

The main table of this volume is devoted to the circular and hyperbolic tangents and cotangents for radian arguments ranging from 0 to 2 at intervals of 0.0001. Supplementary tables for all four functions over the range from 0 to 10 at intervals of 0.1 are also included. The entries are given generally to eight significant figures. Introductory remarks deal with the method of computation, direct interpolation, and inverse interpolation. A comprehensive bibliography is included. The present tables are a companion volume to the Tables of Circular and Hyperbolic Sines and Cosines. - V. S.

7612. Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook, 1944. Tulsa, Okla., Rinehart Oil Report Publication (mim.), 1944. Price, $5.00

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The Rinehart's Yearbook of 1944 covers the oil developments that toc place during 1943 in the following 15 States: Kansas, Oklahoma, Texas, Ne Mexico, Louisiana, Arkansas, Mississippi, Nebraska, Missouri, Iowa, North Dakota, South Dakota, Georgia, Alabama, and Florida. The new oil-pool dis coveries are the main subject. In addition, the material is broadened in most cases to comprise such topics as reviews of development, analysis of exploration, new gas discoveries, oil production, cumulative production figures, extensions of old pools, etc., as well as local problems. The da include statistics and numerous maps. - V. S.

10. PATENTS

7613. Gun Perforator; Lloyd Spencer, Los Angeles, Calif., assignor to La Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Pa 2,331,057, issued October 5, 1943.

A gun perforator comprising: A plurality of gun units in the form o cylindrical disks having a greater diameter than thickness, said cylindri disks being stacked axially, each gun unit having a laterally directed gu bore, and a longitudinally directed cartridge bore wholly open at one axi end, each cartridge bore being covered by the adjacent gun unit; means fo securing said gun units together in a manner to withstand explosive press and means defining passages connecting the cartridge bores of said gun un in series whereby the flame incidental to discharge of one gun unit is propagated to the succeeding gun unit. - Claims allowed, 20.

7614. Magnetic Field Responsive Device; D. W. Moore, Jr., New York, N. Y assignor to Fairchild Aviation Corporation, a corporation of New Yor U. S. Patent 2,331,617, issued October 12, 1943.

A magnetic field responsive device comprising, exciting coil means, periodic wave supply circuit for said coil means, a pivoted magnetic arma disposed within the field of said coil means, said armature being balance in the field of said coil means in the absence of an external field but s ject to vibration in the presence of an external field having a component a plane normal to said pivotal axis, and means responsive to vibration of said armature for giving an indication of said external field. - Claims allowed, 16.

7615. Time-Break Circuit; O. S. Petty, San Antonio, Tex. U. S. Patent 2,331,627, issued October 12, 1943.

A time-break circuit for seismic surveying comprising in combinatio source of current, an iron core inductance and the bridge wire of a blast cap connected in series, a recording galvanometer, a transformer connecte in series with and associating said series circuit and said galvanometer, said circuit constants being such that the transformer output changes fr a multiple to a derivative of the signal voltage supplied to the circuit the time of firing of the cap. - Claims allowed, 7.

7616. Seismic Surveying; F. C. Farnham, Rolla, Mo. U. S. Patent 2,340,314, issued February 1, 1944.

In a method of seismic surveying wherein a charge of explosive is detonated and the resulting seismic waves are detected and recorded, the steps which comprise, arranging the detectors in general alignment with the explosive charge, distributing the explosive charge in generally V-shaped alignment having the apex of the V pointed away from the detectors and having the alignment of detectors approximately bisecting the interior angle formed by the distributed explosive charge, adjusting the interior angle formed by the V-shaped explosive charge to render the vector component toward the detectors of the explosive propagation velocity approximately equal to the seismic wave propagation velocity inherent in the earth structure being surveyed, and initiating the explosion at the apex of the V-shaped distributed explosive charge. - Claims allowed, 5.

7617. Seismic Recording System; Conrad Reichert, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,340,770, issued February 1, 1944.

Apparatus for the transmission by radio of a signal indicative of the instant of detonation of an explosive charge, to a plurality of remote receivers and recorders of radio, sound and seismic waves, comprising, in combination, a generator and transmitter of a radio wave of normally fixed frequency, means actuated with the detonation of the explosive to modulate said wave, a periodic bouncing mechanism normally restrained, means actuated by the firing of the explosive to release said mechanism, and means modulating said wave at each bounce. - Claims allowed, 8.

7618. Perforating Method and Apparatus; W. L. Kitsman, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,340,966, issued February 8, 1944.

In a method of the character described, the steps comprising disposing a plurality of firing mechanisms and corresponding explosive means at different elevations in a well bore, moving a device downwardly through the well bore and into engagement with at least one of the firing mechanisms, and actuating said one of the firing mechanisms upon further downward movement of the device to fire the corresponding explosive means without actuating at least one other firing mechanism that is located at a higher elevation sufficiently to fire the corresponding explosive means which is adapted to be fired upon predetermined actuation of said one other firing mechanism. - Claims allowed, 8.

7619. Gravity Meter; J. M. Ide, Alexandria, Va., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,341,323, issued February 8, 1944.

A gravity meter comprising a base provided with an upright member, a
substantially horizontal beam weighted at one end, a resilient member con
ing the other end of said beam to said base for pivotal movement about a h
zontal axis passing through said resilient member at right angles to the a
of the beam, a coil spring attaching the weighted end of the beam to a po
on said upright member located above said beam, said point and the weight
end of the beam being located on opposite sides of a vertical plane passi
through the pivotal axis, the axial length of said coil spring when unstressed being equal to the distance between said point and said plane
measured along a line drawn between the two attachment points, and means
for observing the motion of the beam under the effect of the force of gra
- Claims allowed, 6.

7620. Method for Determining the Nature of Formations Encountered in Wel
Drilling; Daniel Silverman and R. W. Stuart, Tulsa, Okla., assignors
Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U
Patent 2,341,745, issued February 15, 1944.

The method of determining the nature of a formation encountered duri
well drilling operation, wherein a circulating fluid is employed, which c
prises interrupting said drilling operation, forcing by reverse circulati
a small amount of drilling fluid through the drill bit into the drill st
above said bit, and testing, within said drill stem immediately above sa
drill bit, at least a portion of said small amount of drilling fluid for
least one property indicative of the nature of a substance present in the
formation being penetrated by said drill bit. - Claims allowed, 1.

7621. Apparatus for Echo Distance Measurement; E. E. Turner, Jr., West
Roxbury, Mass., assignor to Submarine Signal Co., Boston, Mass., a
ration of Maine. U. S. Patent 2,342,171, issued February 22, 1944.

In an echo distance measuring system, the combination of a recordin
vice having a stylus arranged to be moved repeatedly across the record p
and to produce a mark thereon in response to an electric potential, a sig
receiving circuit for producing a marking potential upon the receipt of
signal impulse, said receiving circuit including a push-pull amplifier c
odd number of stages both sides of which are balanced with respect to gr
said amplifier having input and output circuits, and means under the co
of the operator for feeding back an amount of energy from the output of
amplifier to the input thereof sufficient for setting it into oscillatio
whereby an electrical potential is produced for making a reference mark
the record paper. - Claims allowed, 1.

7622. Apparatus for Making Geophysical Explorations; H. M. Evjen, Houst
Tex., assignor to Nordel Corporation, Houston, Tex., a corporation
Delaware. U. S. Patent 2,342,626, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit including a source of direct current, a pair of spaced earth electrodes, and reversing means connected between said source and said electrodes for reversing the direct current at a predetermined controlled frequency whereby an earth current having a predetermined frequency is passed through the earth between said electrodes, a potential circuit including potential pick-up electrodes located at spaced points lying within the field of influence of said earth current, a direct current indicating device connected to indicate the potential of said potential circuit, and reversing means synchronized with said reversing means and connected between said potential pick-up electrodes and said indicating device to convert the picked-up potential difference into a unidirectional potential suited to actuate said indicating device, and coupling means connected between said earth-current circuit and said potential circuit to impress on said potential circuit a balancing potential which is directly proportional to the current flowing in said earth-current circuit at the instant of measurement, said coupling means comprising a motor generator including a direct-current generator having a field winding connected in series with said earth-current circuit and having an armature driven at substantially constant speed by said motor, said generator being of the type supplying a current which is proportional to field excitation, and a potentiometer connected to be fed by said generator to develop a potential drop proportional to the current flowing in said earth-current circuit, said potentiometer being connected in said potential circuit to apply thereto a potential drop opposing the potential picked up from said potential pick-up electrodes. - Claims allowed, 4.

7623. Apparatus for Making Geophysical Explorations; K. H. Evjen and H. M. Evjen, Houston, Tex., assignors to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,627, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit including a source of direct current, a pair of spaced earth electrodes, and reversing means connected between said source and said electrodes for reversing the direct current at a predetermined controlled frequency whereby an earth current having a predetermined frequency is passed through the earth between said electrodes, a potential circuit including potential pick-up electrodes located at spaced points lying within the field of influence of said earth current, a direct-current indicating device connected to indicate the potential of said potential circuit, and reversing means synchronized with said first reversing means and connected between said potential pick-up electrodes and said indicating device to convert the picked-up potential difference into a unidirectional potential suited to actuate said indicating device, and coupling means connected between said earth-current circuit and said potential circuit to impress on said potential circuit a balancing potential which is directly proportional to the current flowing in said earth-current circuit at the instant of measurement, said coupling means comprising a resistance connected in series with said earth-current circuit on the direct-current side of said first reversing means to carry a predetermined portion of the current in said earth-current circuit and arranged to develop a potential drop proportional to the current flowing in said earth-current circuit, a second resistor connected in said potential circuit on the alternating-curre side of said second reversing means, an interrupter connected to produce fro said potential drop an alternating current, a transformer having a primary connected to receive said alternating current, a rectifier connected to rectify the current induced in the secondary of said transformer, and a reversing means synchronized with said first reversing means connected to reverse said rectified current and to supply the same to said second resistor, whereby the potential drop in said second resistor corresponds in direction to the potential pick-up by said potential pick-up electrodes and is directl related to the total current flowing in the earth-current circuit at the instant of measurement. - Claims allowed, 3.

7624. Frequency Converter System for Geophysical Prospecting; W. B. Lewis, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,676, issued February 29, 1944.

A system for electrical prospecting comprising an earth-current circuit including a source of alternating current of a given frequency, a pair of spaced earth electrodes, a frequency converter including a reversing means operating at a controlled lower frequency connected between said source and said electrodes for converting said alternating current to an alternating c rent of said controlled frequency whereby an earth current of said controlle frequency is passed through the earth between said electrodes, a potential circuit including potential pick-up electrodes located at spaced points lyi within the field of influence of said earth current, a direct-current indicating device connected to indicate the potential of said potential circuit, reversing means synchronized with said first reversing means and connected between said potential pick-up electrodes and said indicating device to convert the picked-up potential different into a unidirectional potential suite to actuate said indicating device, and coupling circuits interconnecting sa earth-current circuit and said potential circuit to impress on said potentia circuit a unidirectional balancing potential which is directly proportional to the current flowing in said earth-current circuit at the instant of measu ment, said coupling circuit comprising a transformer having a primary connected in the earth-current circuit on the higher-frequency side of said con verter to receive alternating current from said source, a rectifier connecte to the secondary of said transformer to rectify the induced potential, a resistor connected to receive rectified current from the rectifier and to ther develop a potential drop proportional to the instantaneous current flowing i said earth circuit, and connections for balancing the potential drop in sai resistor against the rectified picked-up potential. - Claims allowed, 2.

7625. Apparatus for Well Logging; A. L. Ackers, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S Patent 2,342,827, issued February 29, 1944.

Apparatus for locating a fluid interface, comprising means for heating fluids in which said apparatus is immersed, means for controlling said heati to maintain a substantially constant temperature, means for measuring a parameter of the energy input necessary to maintain said substantially constant temperature, and means for raising and lowering said heating means and said temperature control means. - Claims allowed, 8.

7626. Apparatus for Making Geophysical Explorations; H. M. Evjen, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,343,140, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit including a source of direct current, a pair of spaced earth electrodes, a motor-driven mechanical reversing switch connected between said source and said electrodes for reversing the direct current at a predetermined controlled frequency whereby an earth current having a predetermined frequency is passed through the earth between said electrodes, a potential circuit including potential pick-up electrodes located at spaced points lying within the field of influence of said earth current, a direct-current indicating device connected to indicate the potential of said potential circuit, a second motor-driven mechanical reversing switch synchronized with said first reversing switch and connected between said potential pick-up electrodes and said indicating device to convert the picked-up potential difference into a unidirectional potential suited to actuate said indicating device, a coupling circuit connected between said earth-current circuit and said potential circuit to impress on said potential circuit a balancing potential which is directly proportional to the current flowing in said earth-current circuit at the instant of measurement, said coupling circuit comprising a resistance connected in series with said earth-current circuit to develop a potential drop thereacross proportional to the current flowing in said earth-current circuit, a second resistance connected in said potential circuit, a transformer having its primary connected across said first resistance and a secondary connected across said second resistance, a third motor-driven mechanical reversing switch connected between said first resistance and said primary for periodically reversing the flux induced by said primary and thereby inducing an alternating potential in said secondary, and a fourth motor-driven mechanical reversing switch operating in synchronism with said third reversing switch and connected between said secondary and second resistance for rectifying the secondary potential and connected to supply a unidirectional current to said second resistance to develop a potential drop therein opposing the picked-up potential and bearing a definite relationship to the earth current at all times. - Claims allowed, 3.

7627. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,343,772, issued March 7, 1944.

In the method of geochemical prospecting according to which soil samples are systematically recovered over an area to be investigated and subjected to a treatment for the determination therein of the quantity of a constituent significant of the existence of subsurface deposits, the steps of separating the clay from the sand in the sample and analyzing the clay portion for the aforesaid constituent. - Claims allowed, 2.

7628. Wall Scraper and Well Logging Tool; W. L. Church, Houston, Tex. U
Patent 2,344,598, issued March 21, 1944.

A device for taking samples from a well comprising a sample-receivin
chamber having an inlet, a wall-scraping probe pivotally mounted relative
the wall of the chamber and movable to active or inactive positions and p
vided with a channel, means to move the probe to active position to engag
the wall of the well bore, said probe being mounted relative to the inlet
whereby to cause the wall formation to pass along said channel and throug
said inlet into the chamber, when the probe is in active position, upon
longtudinal movement of the device in a well. - Claims allowed, 8.

7269. Method of Measuring Earth Potentials; Herbert Blasier, Arcadia, C
U. S. Patent 2,344,672, issued March 21, 1944.

The method of determining the potential difference between a buried
metal structure and a point in the earth which includes placing a conduct
in known capacitative relation with that point, connecting the conductor
the buried metal structure, and measuring the quantity of electricity th
flows through the connection as a result of said potential difference. -
Claims allowed, 9.

7630. Gun Perforator Device; C. H. Keplinger, Centralia, Ill., assignor
Shell Development Co., San Francisco, Calif., a corporation of Dela
U. S. Patent 2,344,778, issued March 21, 1944.

The combination of a gun perforator adapted to be lowered into a we
on a cable and to discharge projectiles into the walls of the well, and
bullet catcher adapted to receive the bullets which fail to penetrate th
walls of the well and fall down by gravity, said bullet catcher comprisi
a receptacle having an open upper face and a perforated bottom, said rec
being positioned below said gun perforator and attached thereto. - Claim
allowed, 5.

7631. Subsurface Prospecting; D. G. C. Hare, Houston, Tex., assignor to
Texaco Development Corporation, New York, N. Y., a corporation of
Delaware. U. S. Patent 2,345,119, issued March 28, 1944.

The method of investigating the formation around a borehole which c
prises lowering through the hole a source of gamma rays and neutrons, de
ing the gamma rays scattered in the formation and returned to the hole t
determine the density and atomic number of the formations surrounding th
hole and simultaneously and separately detecting the neutrons scattered
the formation and returned to the hole to determine the presence in the
formation of substances containing hydrogen. - Claims allowed, 6.

7632. Geochemical Prospecting; R. T. Sanderson, Sierra Madre, Calif., assignor to Stanolind Oil and Gas Company, Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,345,219, issued March 28, 1944.

Apparatus for geochemical prospecting comprising a container, a mass of hydrocarbon sorbent in said container, said container being provided with openings to subject said sorbent to soil gases, a layer of a water removal reagent disposed between said openings and said sorbent, separate layers of reagents for the removal of acidic and basic gases disposed between said first-mentioned layer and said sorbent, and means for suspending said container in a shallow well. - Claims allowed, 11.

7633. Method of Seismic Prospecting; W. E. Pugh, Tulsa, Okla., assignor to Seismograph Service Corporation, Tulsa, Okla., a corporation of Oklahoma. U. S. Patent 2,345,288, issued March 28, 1944.

A method of seismic surveying that comprises the steps of dividing a traverse into equal intervals, locating in alternate intervals a plurality of equally spaced detecting stations to form alternate spreads, creating seismic waves at both ends of each spread and also at the far extremity of the adjacent interval at opposite ends of the spread, separately detecting at each spread the waves which have been so created at each point, amplifying and recording the detected waves in coordination with time. - Claims allowed, 4.

7634. Geophysical Prospecting; F. W. Lee, Owings Mills, Md. U. S. Patent 2,345,608, issued April 4, 1944.

A method in geophysical surveying, comprising the steps of (a) establishing a flow of electric current through the earth between two points, (b) measuring potentials from a third point intermediate the first two points to other points on a line transverse to the line connecting the first two points, (c) determining the relative magnitude and sign of the transversely measured potentials which reflect and thus indicate the presence and location of strike of subterranean strata, and (d) repeating steps a, b, and c in various orientations of current flow near the position at which a subterranean strike is indicated, until equality of magnitude, with opposite sign if magnitude is other than zero, establishes accurately the direction of strike. - Claims allowed, 18.

7635. Coring Apparatus; G. H. Fisher, Dewey, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,345,739, issued April 4, 1944.

In apparatus of the character described, the combination comprising a core receiving receptacle adapted to be lowered into a borehole, a housing, a drive head reciprocably disposed within the housing and connected to the core receptacle, a fluid-actuated hammer within the housing for imparting

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a thrust to the drive head to urge the core receptacle into the formation the bottom of the borehole, a conduit in the borehole for transmitting an actuating fluid at superatmospheric pressure into the housing, and means f actuating fluid from the housing. - Claims allowed, 9.

7636. Well Logging Method; W. M. Zaikowsky, Pasadena, Calif., assignor, mesne assignment, to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,346,203, issued April 11, 1944.

The method of borehole logging which comprises causing different por of a fluid column to interact substantially simultaneously with correspon formations at different levels of a borehole, thereby subjecting said por to a change in characteristic in accordance with the nature of the corres ing formations, recovering portions of said fluid column from different l of said borehole after interaction with the respective formations, while serving in the individual portions indications of any such interactions, analyzing each of said portions with respect to changes in said character to determine the natures of the formations present at different levels of borehole. - Claims allowed, 13.

7637. Gun Perforation in Wells; E. F. Raymond, Wilmington, Calif. U. S. Patent 2,346,233, issued April 11, 1944.

A gun perforator for use in wells, comprising an elongated body mova downwardly along a cable lowered in the well in advance of the perforator plurality of gun units positioned in the body at right angles with the bo axis and spaced at intervals longitudinally thereof, a firing member disp able in a vertical direction within the body, and means contained in each said gun units and coacting with said member to cause all of said gun uni be fired by movement of the member in said direction. - Claims allowed, 1

7638. Seismic Surveying; J. D. Eisler, Tulsa, Okla., assignor to Stanoli Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Paten 2,346,369, issued April 11, 1944.

An apparatus for seismic prospecting including a seismometer adapted produce electric waves in response to seismic waves, an amplifier for sai electric waves, and a recorder for recording the output of said amplifier the improvement comprising an electric band pass filter interposed in sai apparatus between said seismometer and said recorder, said filter being s designed and constructed that in the range of frequencies defined by said band the phase shift between output from said seismometer and input to sa recorder varies substantially linearly with frequency in such a manner th the apparent phase shift at zero frequency is an integral multiple of π radians. - Claims allowed, 3.

7639. Determination of Underground Strata; A. D. Garrison, Houston, Tex., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,346,481, issued April 11, 1944.

A device for locating oil-bearing formations traversed by a borehole comprising a housing adapted to be lowered through the hole, a source of ultraviolet light in said housing, a quartz bar supported by said housing for conducting a beam of said light onto the formation walls, means in said housing for recording variations in fluorescence produced by said light on said walls, and a second quartz bar disposed to conduct said fluorescence from said walls to said recording means. - Claims allowed, 5.

7640. Damping Device in Gravimeters; A. R. Lindblad, Stockholm, and J. D. Malmqvist, Boliden, Sweden, assignors to Bolidens Gruvaktiebolag, Stockholm, Sweden, a joint-stock company, limited of Sweden. U. S. Patent 2,346,593, issued April 11, 1944.

In a gravity meter adapted for use in measuring the force of gravity or small changes therein, comprising in combination a movable weighing body, a support for said weighing body, means for elastically securing the weighing body to the support and for counterbalancing the gravitational force component acting upon the weighing body, means for damping the weighing body, said means comprising at least two plates carried by the weighing body and at least two stationary plates secured to the support, and which are positioned at substantially exactly the same distance respectively from the stationary plates, all of said plates having uninterrupted plane surfaces and being of the same area whereby at least two narrow gaps are formed between the stationary plates and the plates carried by the weighing body, and whereby a fluid in the gaps will be acted upon by the moving plates to effect a damping of the weighing body, the plates forming one of said gaps being insulated one from the other and constituting elements of a condenser the capacity of which is a function of the displacement of the weighing body. - Claims allowed, 2.

7641. Method of Detecting Petroleum Deposits; P. F. Dougherty, Chester, Pa., and P. D. Barton, Phoenixville, Pa., assignors to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U. S. Patent 2,346,735, issued April 18, 1944.

The method of detecting subterranean deposits of petroleum which comprises collecting a sample of earth from a determined location, subjecting such sample to treatment and analysis adapted to determine the amount of water and the amount of low-boiling hydrocarbons present therein, comparing the said determinations and ascertaining the ratio between said amounts, and utilizing said ratio as an index of the proximity of the location from which said sample was obtained to deposits of petroleum. - Claims allowed, 3.

7642. Well Logging; E. E. Roper, Tulsa, Okla., assignor to Stanolind Oil
Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent
2,346,789, issued April 18, 1944.

A method of determining information on the extent and contents of ea formations penetrated by a well, including the steps of measuring the pen trating radiation from said formations at a plurality of points in a zone said well, determining the response of the apparatus used for measuring s penetrating radiation to varying amounts of potassium, and determining th relative amounts of potassium in said formation in said zone, whereby sai measurements of penetrating radiation can be modified in order to elimina the effect on said measurements of radioactive potassium. - Claims allowe

7643. Well Surveying Device; R. G. Piety, Bartlesville, Okla., assignor
Phillips Petroleum Co., a corporation of Delaware. U. S. Patent
2,347,794, issued May 2, 1944.

A method of electrically logging a borehole comprising suspending an elongated electrode in the borehole to be logged, grounding a second elec trode, setting up an electrical potential between the two electrodes wher electric current flows between the two electrodes, suspending an explorin electrode in the well bore intermediate the ends of the elongated electr end electrically insulated therefrom, simultaneously setting up an electr potential between the exploring electrode and the second electrode, simul taneously moving the elongated electrode and the exploring electrode in relation thereto along the borehole, and simultaneously measuring the cu flowing between the exploring electrode and the second electrode as the exploring electrode moves along the borehole. - Claims allowed, 8.

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